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EDITORIAL.

Mr. D. H. NEWLAND, of our editorial staff, has been appointed an associate editor. Mr. Newland is a graduate of Hamilton College and took a post-graduate course at the universities of Munich, Heidelberg and Columbia. Subsequently he was associated with Mr. Jas. F. Kemp in mapping the Adirondacks for the State Geological Survey of New York. Mr. Newland helped in the preparation of the last three volumes of 'The Mineral Industry' and has recently made a tour of the copper regions of the Southwest, as is evidenced by the articles on the mines of Arizona now appearing in our columns. This appointment is a recognition of ability and good work.

WE ARE GLAD to state that Dr. Edward D. Peters has been appointed Professor of Metallurgy in the Department of Mining and Metallurgy of Harvard University. Dr. Peters is a graduate of the Medical School of the university which has honored him by this appointment. To our readers he needs no introduction, for as an authority on copper smelting and as a mining engineer of wide experience he has won an enviable distinction. It is with pleasure that we add to the above that Dr. Peters is about to prepare another book on the metallurgy of copper, and has agreed to become a special contributor to this JOURNAL.

BY FORTUNATE COINCIDENCE we are enabled to publish two useful contributions on the part played by copper when present in cyanide solutions. These communications illustrate the value of an interchange of opinion among professional men who are apt to encounter similar problems in places far apart. Mr. Yeandle touches on a difficulty which has faced many metallurgists when precipitating copper from cyanide solutions, and we trust that his invitation for further statements of experience from others will be accepted by some of our readers. Mr. Virgoe is a well-known authority on cyanide practice, and we have reason to believe that the account of his investigations will be read with keen interest by that large army of men to whom KCy is the symbol of a great metallurgical agent in the treatment of ores.

THE CONTRIBUTION by Mr. Walter E. Koch on the use of hot blast in pyrite smelting will be found interesting and practical; it has been struck straight from the anvil of experience, and is worth a great deal of discussion.

WE ARE INFORMED that a number of the principal mine-owners of the State of Chihuahua, Mexico, headed by the governor of the State, have subscribed a fund of $15,000 for the purpose of investigating the possibility of establishing an independent smelting plant. Mr. Jas. W. Malcolmson has been engaged to report on the output of the mines and the best situation for the proposed smelter.

THE SHIPMENT OF $9,300,000 in gold from New York by a single steamer last week makes the largest cargo of that kind on record. *La Lorraine,* the French steamer which carried this cargo, would have made a rich prize for the buccaneers, did those gentlemen still pervade the Atlantic as in former days.

THE RECORD FOR low costs of operation is held in Western Australia by the Cosmopolitan Proprietary mine, the expenses of mining and milling having been brought down to 15s. 4d, or $3.68 per ton. This result is due largely to the efforts of the manager, Mr. H. A. Shipman, formerly in charge of the Independence mine, at Cripple Creek, Colorado. Notwithstanding great natural obstacles to economy in mining, and the high price of labor prevailing in Western Australia, that region bids fair to create further records in this department of industrial activity.

HAVING REGARD to the fact that the Chemical, Metallurgical and Mining Society of South Africa has done—and is doing—such splendid work, it is a pity that its publications should be disfigured with the repeated confused use of the word 'mesh' in describing mill-screens. In the Society's *Journal* for February there appear in the same article references to "900 mesh" and "900 standard screening"; from the context it is evident that this refers to 30-mesh, which is 30 holes per linear inch or 900 holes per square inch. It is hopeless to discuss technical questions unless terms of precision are used intelligently, and we mention this particular misuse of the word 'mesh' because it has appeared persistently in the Society's invaluable transactions.

THE GERMAN Steel Syndicate has secured, after long negotiation, the adherence of the Phoenix Company at Ruhrort, the only large concern remaining outside of the combination. The directors of that company were opposed to joining the syndicate, but at the recent annual meeting the stockholders passed, by a large majority, a resolution instructing the directors to make the required agreement. The Steel Syndicate will, therefore, be in practical control of the German trade in finished steel products, as no important mills will remain independent.

THE FUTURE OF JOPLIN.

It is a common impression that the famous Joplin district is on the wane; yet it is making an output this year at approximately its maximum rate. Therefore, it is denied by some that the district is on the wane at all. The facts are, that the district is still able to make an output of about 250,000 tons of ore per annum, but in order to do it the ore must now fetch in the neighborhood of $34 per ton, whereas five years ago it could do it at $24 per ton. This is to say, the lenses of easily mined ore have been exhausted to a considerable extent, and the output has lately been derived more and more from the 'sheet ground' deposits of disseminated ore, which are lower in grade and more costly to mine; therefore, the cost of production has risen. There are no statistics to show what proportion of the output is now derived from this character of ground, but a very well informed Joplin miner expressed to us the opinion that it was in the neighborhood of 40 per cent; at all events, it is rather large.

Any development in the market for spelter and ore operating to diminish the value of the latter would, therefore, materially cut off the Joplin production. New discoveries of lens deposits will be made, especially when the high price for ore is a stimulus to prospecting, as at present, but during the last five years the new discoveries have fallen far short of replacing the old ones that have been exhausted. In the natural order of things competition will tend to reduce the value of ore; that is, the competition of other zinc mining districts. It will then be up to the Joplin miners to meet the new conditions. They will do so without doubt, because although their district has apparently reached already its climax with respect to tonnage, its resources are still very large.

There may be improvements in the milling practice, which will afford a higher extraction of mineral, at only slight increase in the cost of the process; there may be reductions in the royalties of the land owners; there may be modifications of the present system of leaseholds, which will permit more extensive undertakings by individual operators; and there may be consolidations which will diminish the fixed charges for pumping, administration, development, etc., enabling more economical mining and milling plants to be erected, and both the low-grade ground and the deeper levels to be exploited more advantageously. There are already signs of the inauguration of some such new policy, and we think that the Joplin miners, who have showed so much aptitude, skill and common-sense in their past experience, will rise to meet such problems as the future may present.

FAULTS AND LODE-STRUCTURE.

On another page we give an excerpt from the geological report on the Globe district, in Arizona, prepared by Mr. F. L. Ransome and published by the United States Geological Survey. This report is a notable contribution to economic geology, and will prove of especial assistance to those who are engaged in the development of the important copper mining regions in the Southwest.

In choosing a portion of the report for reproduction in this JOURNAL, we regret that the exigencies of space compel us to omit the geological map which accompanies the description in the original publication. We have chosen a part of the chapter on faulting as dealing with a subject little understood and yet of the most direct practical importance in mining operations. Much money is wasted in explorations which are directed without any clear understanding of the complications brought about by those movements in the rocks which are successively the precursors and the concomitants of ore deposition. Ore deposits are formed along fault-fractures, and subsequent ruptures find a line of least resistance either in or alongside the lodes originating from the earlier breaks. By the connections thus established between different intrusions of eruptive magma and by their shattering of the rocks so as to facilitate chemical activity, faults become a prime factor in mineralization. The Old Dominion mine is an interesting illustration of conditions created in this manner, and the section which we publish will prove suggestive.

The distinction between faults which determined the lines of original ore formation and those which are later than the last period of active mineralization, that is, between mineral faults and post-mineral faults, is important to the miner. In the Globe district geological investigation has been aided, and successful mining has suffered through a failure to draw such a distinction. But a further difference has been noted between earlier dislocations consequent upon a diabase eruption and followed by the deposition of sulphide ores and a later period of fracturing associated with an intrusion of dacite and accompanied then, and shortly afterward, by a chemical activity which re-distributed—by solution and precipitation—the original ores, so as to form secondary enrichments. Another striking piece of geological testimony is that which warrants the conclusion that the intrusion of the diabase and the faulting associated with the primary ore deposition "must have taken place within a very moderate distance of the surface as it was at that time." This of itself

is—it seems to us—suggestive of the intimate connection which exists between the conditions—physical and chemical—to be found in the approach to the exterior of the earth and the formation of the ore bodies valuable to man.

COPPER IN 1903

The world's production of copper, which has shown an increase of 118.5 per cent in the fifteen years since 1888, and which has almost exactly doubled in the twelve years since 1891, has shown in the last three years a more moderate growth. For ten or twelve years the average increase each year was between 8 and 10 per cent; but last year it was only 4.5 per cent, as compared with 1902.

We give on another page the estimate prepared by Messrs. Henry R. Merton & Company, of London, whose long experience and intimate acquaintance with the trade give them exceptional facilities for collecting statistics and estimating quantities where necessary. The figures prepared by them are generally accepted as very close approximations to absolute correctness. For the past year they have used for the United States the output as collected and estimated by the ENGINEERING AND MINING JOURNAL.

In the following table we give a condensed statement of the copper output of the world, as estimated by Messrs. Merton, for 1902 and 1903, the figures being in long tons, of 2,240 lb.:

	1902. Tons.	1902. Per ct.	1903. Tons.	1903. Per ct.
United States	292,870	54.1	298,650	52.8
Other North America.	55,270	10.2	66,695	11.8
South America	38,750	7.2	40,865	7.2
Europe	91,540	16.9	94,020	16.6
Asia	29.775	5.5	31,360	5.6
Africa	4,450	0.8	5,230	0.9
Australasia	28,640	5.3	29,000	5.1
Totals	541,295	100.0	565,820	100.0

The total increase shown last year was 24,525 tons, or 4.5 per cent. Nearly one-half of this was from the mines of North America outside of the United States; that is, from Mexico and Canada. South American mines showed some gain, chiefly owing to more active working in Chile, and not to the opening of new mines. The European increase was nearly all from Russia; while that of Asia was from Japan. The gain in Africa was due to the recovery of the mines in Namaqualand from the injuries inflicted in the Boer war. The output of Australasia was stationary, and we do not see the promised gain from new mines in New South Wales and Queensland. As for several years past, the greater part of the production was from the pyrite deposits of Mount Lyell, in Tasmania.

In fact, the new sources of copper supply opened in the past two or three years are all in North America. The new mines of the Lake Superior region and of the Bisbee district in Arizona, in the United States; the Cananea and Nacozari deposits in Mexico, and the mines of the Boundary district in Canada, are the important copper producers lately developed. We have heard a great deal about the deposits of copper in Rhodesia, but very little has been done there; no proof of their value in the form of actual shipments of metal has been recorded.

Besides the production given above, it is believed that there is some copper mined in China. It is impossible, however, to ascertain any facts with regard to this, and therefore it is not included in any of the reports.

We have reason to anticipate a somewhat greater increase in output in 1904 than was shown in 1903. The United States production will be greater, unless conditions should arise which cannot now be foreseen; and a larger output may be expected from Mexico, where the conditions are very favorable for growth. Some falling off may be looked for in Japan, but the loss will not be important in relation to the total.

The world's consumption of copper seems to increase about as fast as the production. Lower consumption in the United States this year is met by more active demand abroad; and it seems quite likely that our own consumption will improve later in the year.

THE SOUTH AFRICAN ASSOCIATION.

The recent meeting, at Johannesburg, of the South African Association for the Advancement of Science, followed immediately by a Conference of Librarians, suggests forcibly that the winning of gold is the pioneer of civilization in its broadest and most humane significance. The objects of the Association are: "To give a stronger impulse and a more systematic direction to scientific enquiry; to promote the intercourse of societies and individuals interested in science in different parts of South Africa; to obtain a more general attention to the object of pure and applied science, and the removal of any disadvantages of a public kind which may impede its progress." These are noble words and express a splendid purpose. That a young society, with a list already of over 1,000 members, should meet in the City of Gold with such an aim to fulfil is a strong reminder that the mining community which faced a long war fearlessly, endured the longer wait since then patiently, suffered the misunderstanding of its own countrymen before and since with equanimity, is destined to lead the advancement of the whole of that continent which in the lifetime of the great explorer recently dead was called dark. Dark it is no longer, thanks to the intrepid adventurers of a generation now passing away and the beneficent activities of an industry which begins with digging holes in the ground and ends in the erection of libraries, the endowment of technical institutes and the association of the energetic and thoughtful from every land. We trust that the educational influences so evident of late in South Africa, will grow in power until the searchlight of science—which means the clear-eyed recognition of fact—dissipates the mists of prejudice that hang around Table mountain, bridges the falls of the Zambesi with hope fulfilled, and irradiates the trackless veldt with the glow which comes from community of purpose in a noble cause.

MARKET CONDITIONS.

May 18.

The metal markets have been generally quiet, and without special event during the week The dullness in the speculative markets and the traditional feeling of an election year has affected almost all branches of trade.

Copper has been quiet and slightly easier in price Business has been on a very small scale. Foreign demand is apparently satisfied for the present, and little has been done for export.

Tin has shown some fluctuations, and has been somewhat stronger for spot metal, which is rather closely held.

Lead is unchanged, with only a moderate consumptive business doing.

Spelter is somewhat easier again, and demand has been only moderate.

Silver has shown comparatively little change this week. The outlook for the future is fair, however, as it is probable that the India Council will be in the market again very shortly; in fact, it is reported that some buying of this kind has been already done. It is believed also that both Russia and Japan will require a good deal of silver in their operations in the East.

The iron markets continue very dull. Buyers seem to have again adopted the waiting policy, and very few new contracts are being placed, either for raw material or for finished steel. What business has been done is mainly for near delivery. The only large order for pig iron reported is one for 30,000 tons, placed by the company which has a contract for castings for the Pennsylvania Railroad tunnel under the Hudson river. The Southern furnaces have reduced prices of foundry iron, the result being that the whole market has given way. Shading in prices for steel billets is also reported on tide-water deliveries. The market as a whole is weak, with only moderate prospects of improvement.

The western coal markets are still unsettled, on account of the delay in lake shipments. Navigation is fairly open now, but vessels are held back by the strike of the masters and pilots. This is preventing shipments of coal to the lower lake ports, and there is still a surplus for local trade.

The anthracite trade continues in good condition, and buyers are taking advantage liberally of the 40c. discount on seaboard prices which prevails during May. There is plenty of coal to be had, and production continues good. Western shipments are tied up on account of the congestion at the lake ports.

The Atlantic seaboard bituminous trade continues dull. More coal has been offered than the market can take care of, and prices are rather weak. Stocks at the seaboard are generally in excess of immediate demand.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The Victoria Falls, of the Zambesi, are a mile long and 347 ft. high. From the gorge below, there rises ever a cloud of spray which reaches 1,100 to 1,200 ft. above the level of the flat, featureless country, surrounding the great chasm into which the Zambesi tumbles thunderously.

More than 20 large steam dredges are in use on the Baltic sea for digging amber from a depth of 7 to 11 yards. Sea amber is characterized by the fact that it has no weathered exterior. Amber is used for making smokers' requisites, beads for bracelets and necklaces, and other trinkets.

The beds of brown coal (lignite), occurring principally in Bohemia and in the Halle district, in Prussia, often attain considerable thickness, 6 to 8 meters being not unusual. At Brühl, near Cologne, the bed of lignite is in places as much as 340 ft. thick. Most of this coal is compressed into briquettes for domestic use.

Even in 1837 a colliery was in operation in the county of Durham, England, at which coal was hoisted by a donkey and banked out and sold by an old woman. Compare this to a modern pit producing 2,000 tons a day from a depth of a quarter of a mile.

An electrically driven winding engine, employing the Koepe system of winding with only one rope, is hoisting 1,000 tons of coal every six hours from a depth of 1,650 ft. at the Gelsenkirchen colliery, in Westphalia. The two electromotors used are each of 1,400 horse-power.

The boreholes in the Baku oil-field have an average depth of 200 meters, some being as much as 500 m. Steam is usually employed as motive power for boring and pumping from the mills.

Cryolite, the double chloride of aluminum and sodium, mined opencast in Greenland since 1857, is consumed principally in the United States for making aluminum and alum.

Nitrate of potassium (saltpeter) is formed whenever animal or vegetable remains come in contact with rocks that weather easily. India is the chief producer, and America the leading consumer, utilizing in the manufacture of gunpowder, etc., 6,100 metric tons in 1903.

The finest example of sardonyx cameo is in King Edward's collection at Windsor Castle. The stone measures 7.5 by 5.875 in., and is cut upon a rich Oriental sardonyx of four strata. It is a contemporary portrait of the Emperor Claudius. The ground is in the dark-brown stratum, the laurel wreath and front of the cuirass in the honey-brown, and the head and hair in the white. The whole is surrounded by a raised border enriched with molding cut in the thickness of the stone.

THE BESSEMER MEDALLIST.

We take pleasure in presenting herewith a portrait of Mr. Robert Abbott Hadfield, of Sheffield, who was presented with the Bessemer medal of the Iron & Steel Institute on May 5. Mr. Hadfield is undoubtedly the most eminent of the younger generation of steel metallurgists and iron masters. It seems paradoxical to use the term "younger generation" in connection with one whose name has been before the public for nearly twenty years. Mr. Hadfield, however, is only 45 years of age, and is still in the heyday of his career.

Mr. Hadfield is an example of the metallurgist who has received his scientific education in the steel works, and not at a college. As a youth he made a study of chemistry and metallurgy in a laboratory specially erected for him at the Hecla works by his father, whose plan was that his son should undertake the scientific side of the business. His father's

ROBERT A. HADFIELD.

premature death upset these plans, and at a very early age the whole of the responsibility of directing the works was thrown on the young man's shoulders. How he was able to rise to the occasion, and not only continue the business successfully, but to extend it enormously, is common knowledge in the metallurgical world.

Mr. Hadfield is best known as the inventor of manganese steel, which is not only hard and tough, but also non-magnetic. He is probably the largest maker of projectiles in the world. At the Hecla and the more recently erected East Hecla works, castings of every description are made, and about 4,000 men are employed. During the last year or so, he has commenced the manufacture of rock-breakers and Heclon gyratory crushers, for which his manganese steel is specially adapted.

His contributions to the literature of metallurgy have chiefly taken the form of monographs on iron alloys, which have been presented to the Iron & Steel Institute, and to the Institution of Civil Engineers. The best known are his papers on 'Manganese Steel.' 'The Alloys of Iron and Nickel,' and 'The Alloys of Iron and Tungsten.' These papers not only contain accounts of his own researches, but enter also into the history and bibliography of the subjects.

Mr. Hadfield's many friends in this country will look forward with pleasure to meeting him at the forthcoming visit of the Iron & Steel Institute in October next.

THE WORLD'S COPPER PRODUCTION.

For many years past Messrs. Henry R. Merton & Company, of London, have issued yearly a circular giving the copper production of the world, which is generally received with confidence, owing to the care used in its preparation. The circular for 1903 is now before us, and we give its figures in the table below. Some of the figures are official and others are close estimates; for the United States the ENGINEERING AND MINING JOURNAL estimates have been used. The figures are in long tons, of 2,240 lb.:

	1902.	1903.	Changes.
Africa:			
Cape Colony	4,450	5,230	I. 780
Asia:			
Japan	29,775	31,360	I. 1,585
Australasia	28,640	29,000	I. 360
Europe:			
Austria	1,015	1,055	I. 40
Hungary	485	330	D. 155
England	480	500	I. 20
Germany	21,605	21,205	D. 400
Italy	3,370	3,100	D. 270
Norway	4,565	5,915	I. 1,350
Russia	8,675	10,320	I. 1,645
Spain and Portugal	49,790	49,740	D. 50
Sweden	455	455	....
Turkey	1,100	1,400	I. 300
South America:			
Argentina	240	135	D. 105
Bolivia	2,000	2,000	....
Chile	28,930	30,930	I. 2,000
Peru	7,580	7,800	I. 220
North America:			
Canada	17,485	19,320	I. 1,835
Mexico	35,785	45,315	I. 9,530
Newfoundland	2,000	2,060	I. 60
Total, other countries	248,425	267,170	I. 18,745
United States	292,870	298,650	I. 5,780
Total	541,295	565,820	I. 24,525

Taking the figures as given for last year, there are some interesting details. The Cape Colony production is from the Cape Copper Company's mines and the Namaqua. No other African output is reported. In Germany nearly nine-tenths of the total—18,975 tons—was from the Mansfield mines. In Norway, 3,200 tons were from the Sulitelma, and 2,715 tons from other mines, all showing increases. Of the Spanish copper 35,810 tons came from the Rio Tinto and 6,320 tons from the Tharsis. Spanish production is nearly stationary. A considerable gain is reported from Russia.

The large increases were in North America, where Canada is making nearly three times as much copper as was reported four years ago. The gain is entirely from British Columbia, chiefly in the Boundary district. In Mexico, the Boleo has shown little change, but nearly five times as much copper is reported from the other mines as was shown five years ago. The gains are chiefly from Nacozari and from the Greene Consolidated. Mexico and Canada, indeed, are the growing copper producers.

Turk's Island, in the West Indies, exported about 1,300,000 bu. coarse packing salt to the United States in the past two years.

Brines from different localities in Michigan, obtained at geologic horizons extending below the Marshall sandstone to the copper-bearing seams, often show appreciable quantities of bromine, but in no case are they better than the brine from the central portion of the Marshall sandstone. A region of good promise as yet undeveloped is in the vicinity of Farwell, Clare county, Michigan.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the ENGINEERING AND MINING JOURNAL.

METALLURGICAL ENTERPRISE IN WALES.

The Editor:

Sir.—In your issue of February 4 I have read the article on 'The Decline of Metallurgical Enterprise in England,' with special reference to Welsh methods. This article might afford sufficient apparent reasons to convince readers not acquainted with the facts that we had lost our old-time prestige. I wish to say in defense, that I think the writer was not sufficiently well posted. I acknowledge that our systems are old and that our superintendents are not chosen because they have had a college education with its attendant diplomas, but rather from their wide practical knowledge and experience, gained from years of work and travel. Go where you will where there is smelting, you find a Swansea man or the remains of his teachings. Our superintendents are not engineers, either mining or civil, nor do they profess to be mechanics. They are what they are, smelters, no more, no less. If our smelters are so ignorant, why can we treat the most refractory ore, separate and put on the market, side products, metals that an ordinary smelter, outside of Wales, never heard tell of or saw, and pay better prices for matte, ship miles, pay better wages (outside of the States) than other countries, and make good profits for the owners, if, as the writer of the article suggests, our superintendents are ignorant?

I myself have had to point out to a theoretical and college-bred superintendent that magnetite could not be used as a flux for the treatment of lead ores with good results; he, not knowing why, had to experiment to find out, and now he does not know what takes place, only that it is inadvisable, so he has discontinued the use of it.

Practice taught me, and such superintendents as the one just referred to object to an intelligent foreman who studies his work and prefers to use head rather than hands. The more mulish the man, the better they seem to like him. They put all their failures on him, and he, not knowing, thinks it is his fault. But these old ignorant superintendents know the value of a thinking man, and the foreman can not be too smart for them. They never think, as does your collegian, that they know it all.

I rather think the reason for our lack of work now is that countries from which we bought our ores have seen the folly of paying freight on dirt, and they now concentrate their output by smelting or otherwise; which, of course, reduces the quantity shipped, and as our plants are large, portions of them only are able to run; therefore, the reason is distinctly not because our superintendents are chosen for their great practical knowledge in lieu of theoretical.

WELSH SMELTER.

Matehuala, Mexico, May 6, 1904.

[This is evidently an earnest plea from one of the many Welshmen who have contributed so much to the beginnings of smelting enterprise in countries foreign to their own, but it is not convincing. If the Welshmen at Swansea showed as much progressiveness as some of their own compatriots in the United States and Mexico, the criticism of Mr. H. F. Collins—to which our correspondent refers—would not have been required.—*Editor.*]

THE CHEMISTRY OF COPPER CYANIDES.

The Editor:

Sir.—I observe that in your issue of March 31 there appears a paragraph upon 'Copper Cyanide Solution,' in which it is stated that Messrs. J. P. Treadwell and C. von Girsewald have recently published the result of their studies upon cupriferous cyanide solutions in the *Zeitschrift für Anorganische Chemie,* and have arrived at the conclusion that the text book formulas, viz.: $K_2Cu(CN)_4$ and $KCu(CN)_2$ are apparently merely guesses, and that copper enters into solution with potassium cyanide as $K_4Cu_2(CN)_6$.

The chemistry involved in the solution of copper compounds in cyanide liquors is of some interest to me, inasmuch as in July, 1900, I wrote a paper upon 'The Titration, Use and Precipitation of Cyanide Solutions Containing Copper,' which was read on December 19, 1901, before the Institution of Mining and Metallurgy. In my reply to the discussion which ensued, it was proved that in a cyanide solution containing copper and a little free cyanide, the copper salt could only have the formula $Cu_2Cy_2.4KCy$, or, writing it a little differently, $K_4Cu_2(CN)_6$. So far Messrs Treadwell and von Girsewald are in accord with me; they have in one respect arrived at the same conclusion only somewhat later in the day.

The text-book formula for cuprous potassic cyanide is $Cu_2Cy_2.2KCy$ or $K_2Cu_2(CN)_4$, and not $K_2Cu(CN)_4$ as your paragraph has it. If the authors of the article you quote have arrived at the conclusion that the text-book formula $K_2Cu_2(CN)_4$ is the formula of a non-existent salt and merely the product of a guessing brain, then on this point I entirely disagree with them. The salt *does* exist, but not in the presence of free cyanide.

Experiments were conducted by me to obtain a clear insight into the chemistry of copper-potassium-cyanide compounds, because no information was available from any written sources; what little information the text-books had on the subject only served to utterly mislead. Moreover, it was felt that the acquisition of knowledge on the subject would be of great value to those cyanide men who were desirous of extending the field of cyanide operations to the treatment of cupriferous material, and it seemed that the general tendency was to attempt to devise practical methods of treatment without making any serious attempts to investigate first of all the actual chemistry of the subject.

Although there is no question that the chemistry of copper compounds in cyanide solutions is complex, and its investigation requires much research and considerable patience, yet the field of practical research is but small so far as the cyanide metallurgist is concerned, for it is limited to weak solutions of cyanide and small amounts of copper.

In the paper before alluded to, entitled 'The Titration, Use and Precipitation of Cyanide Solutions Containing Copper,' it was shown that such solutions titrated differently with silver nitrate with and without the customary indicator potassium iodide. Mr. J. E. Clennell had, unknown to me, written an article to the New York section of the Society of Chemical Industry in January, 1900, upon the same subject. His tests showed an apparent consumption of 3.5 parts by weight of potassium cyanide for every part of copper dissolved when the indicator was used and 2.5 parts of potassium cyanide when the indicator was not used. I do not think Mr. Clennell offered any explanation of this phenomenon. My tests indicated a consumption of 4 parts of potassium cyanide to one part of copper with the indicator and 3.07 parts to one of copper when the indicator was not used.

The divergence between Mr. Clennell's results and mine was satisfactorily and easily explained. During the solution of a copper salt in potassium cyanide, cyanogen is evolved thus—

$$2CuSO_4 + 8KCy = Cu_2Cy_2.4KCy + 2K_2SO_4 + Cy_2.$$

Unless the solution contains free alkali, this cyanogen will be partly lost, and will partly go to form ammonium oxalate, and will not be in a titratable condition, whereas, if free alkali is present, as happened to be the case in the tests made by Mr. Clennell, the following reaction takes place and part of the liberated cyanogen is in a titratable form:

$$Cy_2 + 2KHO = KCy + KCyO + H_2O.$$

I advanced the formula $Cu_2Cy_2.4K\ Cy$ as being the correct one for the copper in solution. It is a formula supplying the requirements of equations illustrating my results, and it also supplies Mr. Clennell with a formula that proves the correctness of his results also. The reason for the two differences in titration results when the indicator potassium iodide is used, and when it is not used, is that silver iodide is not very soluble in a solution of $Cu_2Cy_2.4KCy$, whereas silver cyanide is. However, in addition to its general purpose of heightening an end reaction, the indicator fulfils the further purpose of marking the points where the silver nitrate, having titrated all the free cyanide, is about to attack the cyanide in chemical combination with the copper. The equation showing the action of silver nitrate upon this copper salt is as follows:

$$(1)\ Cu_2Cy_2.4KCy + AgNO_3 = Cu_2Cy_2.2KCy + AgKCy_2 + KNO_3$$

$$(2)\ Cu_2Cy_2.2KCy + AgNO_3 = Cu_2Cy_2 + AgKCy_2 + KNO_3$$

The above reactions explain how a consumption of 3.07 parts of potassium cyanide per 1 part of copper is indicated when silver nitrate alone is used as an indicator, and the equation before given, showing the formation of this salt explains how a consumption of 4 parts of potassium cyanide can take place for every 1 part of copper dissolved.

The higher cuprous potassic cyanide salt appears, therefore, to be without any doubt $Cu_2Cy_2.4KCy$, and this is the salt which is formed when small amounts of copper are dissolved in dilute solutions containing excess of potassium cyanide.

The lower salt is $Cu_2Cy_2.2KCy$. It is to be observed that if a solution of potassium cyanide of known strength be added to a solution of copper sulphate, until the yellow precipitate which will have formed is just dissolved, such a solution will contain 3.07 parts of potassium cyanide to every part of copper and upon titration will yield no results whether the indicator be used or not. The addition of more cyanide will convert this salt into the higher cuprous salt $Cu_2Cy_2.4KCy$; it is therefore a cyanide. These are the two salts which in my opinion most concern the cyanide operator.

The higher cuprous salt is a fair solvent for gold and silver, splitting up into the lower cuprous salt with liberation of two molecules of KCy. The lower salt has practically no solvent power.

Digressing momentarily to plant practice, it will be observed that when potassium cyanide is added to a plant solution containing copper and no free cyanide, there may be no evidence of such addition having been made. I have observed such phenomena where the copper has been present in some quantity as the lower salt, and titrations have been conducted in the usual way with potassium iodide as the indicator; I am also of the opinion that zinc salts, contrary to the general theory, can occur in solution similarly to copper as higher and lower salts, viz., as $ZnCy_2.2KCy$ and $ZnCy_2.KCy$ from evidence afforded by titrating such salts.

I have discovered a further additional salt of copper, liable to occur in solution with potassium cyanide. It is made by agitating excess of Cu_2Cy_2 with potassium cyanide. The filtrate shows reactions upon titration indicating that this salt has the formula, which may be expressed thus: $Cu_2Cy_2.4KCy.Cu_2Cy_2.2KCy$. This salt is in fact a chemical union of the two previously mentioned salts in the proportion of one molecule of the one to one molecule of the other. It was observed that this salt titrated with $AgNO_3$ alone showed an apparent amount of the free cyanide equivalent to one-half of the copper contents. What takes place is as follows:

$$Cu_2Cy_2.2KCy.Cu_2Cy_2.4KCy + 2AgNO_3 = 2Cu_2Cy_2.2KCy + 2AgKCy_2 + 2KNO_3.$$

The higher portion of the salt is attacked and reduced to the lower state, which, being done, any further addition of $AgNO_3$ throws out the insoluble Cu_2Cy_2.

This salt is only a solvent for gold and silver, so far as the higher portions of the compound are concerned.

The insight into the chemistry of copper cyanides obtained by research work in the laboratory has explained clearly most of those problems encountered in handling cupriferous material in practical cyanide work.

WALTER H. VIRGOE.

El Triunfo, Baja California, April 26, 1904.

PYRITE SMELTING—HOT V. COLD BLAST.

The Editor:

Sir.—Some time ago I began to remodel our smelter and this involved taking out a small heater and putting in a larger one preparatory to erecting a larger furnace in place of one of my 48-in. diam. furnaces. Meanwhile one 48-in. furnace has been running on hot blast and the other on cold. Here are two furnaces running under exactly the same conditions as to size, air, ores and fuel—two 48-in. diam. water jackets almost exactly alike. The cold blast furnace has the advantage of a more powerful blower and the blast can be raised to 4 lb., while hot blast furnace gets less than half that pressure; moreover, the cold blast furnace is newer and has a better arrangement of tuyeres. It seemed to me that there was a good chance to compare hot and cold blast results under similar conditions, with results that should be valuable.

The two furnaces are still running side by side. I send you, herewith, results for last month, March. As far as we are concerned the hot blast furnace makes profits and the cold blast comes perilously near making losses, so great is the difference. I can only say that during this run it made our American superintendent rustle to keep the cold blast furnace going, while ordinary Mexican labor kept the hot blast furnace going comfortably. We had to select both ores and coke for the cold blast, while the hot blast took the leavings without 'kicking'; our superintendent, at the end of the first run, remarked, "If we select the ores and coke and charge and watch it very carefully and give it plenty of coke, we can get along, but if we have trouble in the furnace or stoppage of blast, it takes a long time to come around, nor can we run the charges which the hot blast furnace will take." On one occasion a change of ore during the night made trouble in both furnaces; the hot blast one was convalescent and working normally in an hour, the cold blast nearly froze up, and it took nearly all day to come round. At critical periods the hot blast blows the furnace *in* and the cold blows it out. You can put your hand into the cold blast furnace and pull out pieces through the tuyeres, and there are long noses to them often, which is never the case when using hot blast; indicating that the zone of heating effect is larger with the latter. Charges of ore which will work well with hot blast, and slags which run fluid and clean with hot blast, will not work out or run at all with cold blast; in fact, with cold blast you are limited as to charges and slags, and the increase in coke required is a serious item, moreover the coke must be selected and good. We simply could not afford to run cold blast on our low grade ores, and I can see now how cold blast has spoilt many a good pyritic smelting proposition, especially with dear, and often dirty, coke and a limited selection of ores. The oxidizing power of cold blast is far less than that of hot, even after increasing pressure of blast, and there is a great difference in the power of concentration. We get far better and quicker concentration with hot than with cold blast. In every way the advantage remains with the hot blast.

Last week we had our first freeze-up in over two years, and that was on the cold blast furnace; the hot blast furnace went right along, although it ran much slower than usual and the slag was less fluid and the production less. The trouble came, as usual, during the night, with a change of ore in the pile, and although we worked hard, the cold blast furnace died on our hands. The hot blast also suffered, but the Mexicans pulled it straight in a couple of hours. I cannot for the life of me see why any one should advocate cold blast; it seems to me like "smelter suicide." It is certainly like fighting with one hand tied behind your back. It costs nothing beyond the first cost of heater, as in our case the furnace itself supplies the heat and the heater is a most efficient dust-catcher. Our hot blast never runs over 400° F. or 204° C., and seldom reaches that. It should be called "warm blast."

The details of our results for the month of March were as follows:

MARCH 1 TO EASTER FIESTA.

	Furnace A.	Furnace B.	
	Hot blast.	Cold blast.	Hot blast.
Time of run	22 days	16 days	18 days
Ore charged per 24 hours	41 tons	*31 tons	42 tons
Coke charged per cent of charge	6¼ to 6½	*8¾ to 9	5¾ to 6
Coke charged per ton of ore	150 lb. or 7½%	220 lb. or 11%	140 lb. or 7%
Percentage of ore in charge	84	81	85
Concentration	up to 15 to 1, good	below 10 to 1, poor.	up to 15 to 1, good.
Average slag, 45% SiO_2, 37% FeO, 8% CaO and 8% Al_2O_3		less ore and more flux	previous run before change

*Coke and ore were *selected* for cold blast; hot blast got the leavings and did not object.

Further details of the furnaces may be useful: Height from charging floor to base plate, 84 in.; height from charging floor to center of tuyeres, 57 in.; height of center of tuyers above base-plate, 27 in. Each furnace is 48 in. diam. and has twelve 3½-in. inclined tuyeres (pitched downward). The heater for furnace B was erected for a 42-in. diam. furnace and is too small. A larger one is going up now for a 126-in. by 42-in. furnace to displace B, which in turn will displace A and have a larger heater. A has a MacDonald heater, heated by waste gases from furnace. Both furnaces get about 4,000 to 4,500 cu. ft. of air per minute, at about ½-lb. pressure at tuyeres, while B can be run up to 4 lb. at tuyeres. B is a newer and improved furnace in a few details, notably in arrangement of tuyeres, and with hot blast can beat A by a good margin.

I do not consider our coke consumption as low as it should be, and will be, I hope, later on. It should be nearer 5 per cent than 7 per cent per ton of ore, and 10 per cent is quite disgraceful in any furnace matting copper ores.

If loss of time, output, temper and sleep could be put against furnace B on cold blast it would be a large account. No more cold blast for me, although I am still running B on cold blast till the new furnace is ready to erect, but we get tonnage and keep our men together, but it cuts into profits, the cost of coke being over $20 gold per ton at smelter. Furnace B uses over 50 per cent more coke on cold than on hot blast, with the same charges of the same ores.

WALTER E. KOCH.

Santa Maria del Oro, Mexico, April 29, 1904.

THE KLEPETKO WATER-JACKET.

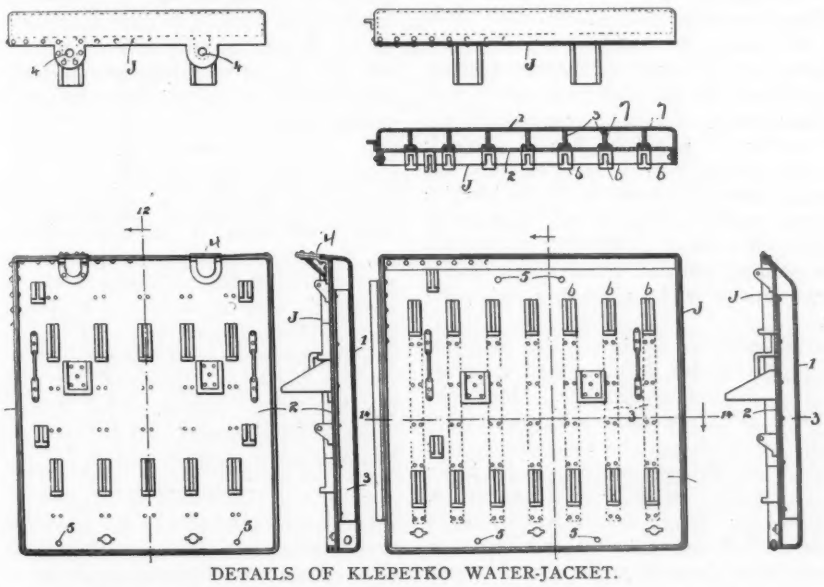
The Editor:

Sir.—There appeared in your isue of April 14 a note by Mr. A. H. Wethey on the Klepetko water-jacket, patent No. 743,731, filed August 8, 1902. In commenting upon this note, and without reference to the patentability or the possibility of protecting a patent on this idea, please note the following:

Water-jackets on these lines have been in use since 1898, and, to the best of my knowledge the first of the kind was put in use by Mr. Frank Klepetko at Great Falls, Mont., in that year. Previous to that time I had used jackets in which the stay-bolts did not reach through the inside skin of the jacket, and had met with the same difficulties that Mr. Wethey notes. These difficulties are, however, totally overcome by making the inside skin of the jacket considerably heavier than is usual, and with the inside skin 0.5 in. thick all tendency to local buckling is overcome, and I am familiar with jackets the inside skin of which is ⅞ in. thick. A thin inside skin tends to buckle locally to a very much greater extent than a thick one.

Concerning stay-bolted jackets, almost everybody who has handled copper ores, and especially those who have handled flue-dust back through the furnaces after it had been 'pugged up' with a binding material or a clayey ore,

realizes with what extreme readiness the moisture in the ore or in the 'pugged up' flue-dust will attack the points where the stay-bolts reach through the jackets. These points, especially along the top end of the jacket, give lodgment to the damp material which contains, besides free sulphuric acid, copper sulphate and other acid salts, and when once a leak has been established around a stay-bolt a comparatively short time is necessary before the stay-bolt will pull clear out of the jacket. In places also, where the nature of the material to be smelted or other conditions are conducive to the formation of bridges, or scaffolds, in the furnace, and where a great deal of barring down is necessary, a stay-bolt head on the inside skin is apt to be caught by the bar and the first leak started in this manner, after which the copper sulphate, free sulphuric acid and acid salts rapidly complete the destruction of the jacket at the leaky spot. This construction (Klepetko) combined with the heavy inside skin of the jacket is now so general that it can almost be called standard, and I know of furnaces, the jackets of which are built in this manner, that have been in service four years without warping the inside skin of the jacket to any appreciable extent.



DETAILS OF KLEPETKO WATER-JACKET.

There is one point shown in the patent drawings for the Klepetko jacket, on which no claim is made, but which is to my mind one of the main features of the jacket and one which prevents warping more than any other feature, namely, the filler-pieces, 6, 6, on the outside skin immediately back of the T-irons, 7, 7, which filler-pieces transmit the weight of the charge from the inside skin directly to the heavy I-beams which bind the jackets together, leaving the inside skin free to move in response to local heating without reference to the actual weight of the charge upon it. In stay-bolted jackets it is not usual to place filler-pieces between the outside skin of the jacket and the binding I-beams and all strains are transmitted to the I-beam through the flanges of the jacket. Where the jackets are narrow the distortion from the lack of filler-pieces is not so great; but where the jackets are broad and supported on their flanges only, the distortion is such that, very often, the outside skin of the jacket is pushed outwardly, by the inside skin acting through the stay-bolts, to such an extent that the outside skin at the center also bears on the binding I-beams; and it is this distortion, very often, that causes stay-bolts to leak. In my experience the stay-bolts most centrally located in the jacket are the most apt to leak; that is to say, the stay-bolts located most distant from the points of support, which are the flanges of the jacket on the outside. Besides this, every three stay-bolts form a practically immovable space in the jacket, and when heat strains come between any three, local distortions beyond the elastic limit of the sheet itself are almost bound to occur. When the inside skin is thin, and consequently very readily heated locally, even when there is water behind it, and especially so if there is some scale on the jacket, this local distortion is very marked. Where the inside skin is thick, and not bound by stay-bolts, and therefore practically free to move in any direction under the influence of local heating, the distortion is at its minimum, especially so if the strains caused by weight or movement of the column of charge in the furnace are transmitted directly to the binding I-beams, and neither the inside skin nor the outside skin are called upon to bear serious buckling strains other than local heat strains.

While commenting on this jacket, please also note the design of the overflow, 4, 4, on which nothing is claimed; but which, to the best of my knowledge, was developed at the same time that the other features of the jacket were developed, and at the same place, and is now in more or less common use.

Another feature of the jacket on which nothing is claimed, is the wash-out device by which each jacket can be washed out and freed from accumulated mud and scale while the furnace is in action. This is accomplished by giving the end jackets a very small lap over the side jackets, leaving one lower corner at least of each jacket free. In the free corner of the jacket, at O, is a gland through which a scraper rod with a scraper blade properly shaped, commands the whole bottom of the jacket. The jacket is also equipped with blow-off valves at the extreme bottom of the outside sheet. By opening these blow-off valves and scraping the bottom with the scraper rod before mentioned, the jackets can be kept clean. Seven months at a campaign, without cleaning (scaling) jackets, is not uncommon, and even after seven months, shut-downs were necessary, not to clean the jackets, but to make crucible repairs. This cleaning arrangement, while in use at a number of places, is not general; and is, of course, not available when there are more than two jackets on a side in any one tier of jackets. Personally, I first saw it used at the Butte & Boston Smelter in Butte, Mont., in 1890-1891.

R. L. LLOYD.

Cananea, Mexico, April 27, 1904.

CYANIDATION OF COPPER-GOLD TAILINGS.

The Editor:

Sir.—With hopes of inciting the publication of data concerning the cyaniding of copper-gold-bearing ores I beg leave to offer the following notes on the cyanidation of oxidized tailings at the plant of the Garduño Mining Company at Placeres de Oro, Guerrero, Mexico.

These tails are the accumulation of 15 years, and are from *arrastres,* pans and, of later years, plates and concentrators, the different processes having been employed in the order named, though the larger part are from the last. The ore, judging from that at present being mined, was quartz carrying iron, arsenical and copper pyrites in the relative proportion in which they are mentioned. The tails are almost entirely free from slime—although the ore slimes badly—owing to their having been collected in very limited settling dams. The tails were crushed for the most part to 30-mesh screens; they are extremely acid, and contain 4 per cent iron and 0.3 per cent copper, mostly in the form of carbonates. The value averages $14.25 (Mexican) per ton. The gold goes readily into solution with very little cyanide, the working solutions being only 0.05 per cent. The leaching is rapid, and four days is the time required for treatment of a 30-ton vat. Three kilograms of lime per ton are used as the neutralizing agent, and the charges are given a preliminary water wash, the consumption of cyanide being 600 grams per ton of pulp.

The selective quality of cyanide is here clearly exemplified, for the copper goes readily into solution in solutions having a strength of 0.1 per cent cyanide, but only in very small quantity in the working solutions of 0.05 per cent. The only difficulty encountered was in precipitation; in strong solutions, the copper had a tendency to precipitate to the exclusion of the gold, and in weak solutions the precipitation was only partial; this was overcome by the addition of cyanide sufficient to increase the strength to 0.08 per cent just before entering the zinc-boxes. The precipitation is mostly effected in the first two compartments, and graduates toward the end of the boxes, the following being the results of assays of 1 liter samples extending over a period of 10 days:

	Grams Au.
Head sample of solution	5.77
Tails of solutions from 2d compartment	0.70
Tails of solutions from 4th compartment	0.56
Tails of solutions from 6th compartment	0.29
Tails of solutions from 9th compartment	trace.

Quite contrary to the idea that copper precipitates to the exclusion of gold in strong solutions, in this case, if we use the terms strong and weak comparatively in reference to different plants, the precipitation of the copper occurs most readily in weak solutions, the immersion of clean zinc shavings in a 0.02 per cent solution for an hour being quite sufficient to precipitate the copper in sufficient quantity to give the zinc a coppery luster throughout the entire mass of shavings.

As the statement that copper precipitates to

the exclusion of gold in strong solutions, say, one per cent, has no doubt been demonstrated fully, the above would seem to suggest that there are defined limits as to the strength of the solutions from which the gold can be precipitated on zinc without interference from the copper.

It is interesting to note that the copper in solutions gradually increases in quantity as the solutions are used over again on fresh ore, and seems to hold itself in readiness to seize the opportunity of a lowering of the strength of the solution to precipitate in quantity. This was demonstrated by diluting working solutions in the presence of zinc shavings.

I would be glad to see notes on the subject from others.

W. H. YEANDLE, JR.

Placeres de Oro, Mex., May 2, 1904.

WASTES IN MINING AND METALLURGY. II.*

BY JAMES DOUGLAS.

For many years after our limited stock of anthracite in Pennsylvania was first mined and marketed, the proportion saved was only 30 per cent of the vein mined. The balance was either left as pillars underground, which were never extracted, or thrown as waste into mountains of culm. Of late the figures have been nearly reversed, for about 60 per cent is recovered, and only 40 per cent is lost, a saving due to somewhat better mining, and to the burning of culm on perforated grates by forced draft. But this loss by no means represents the total, for in many localities, in extracting the coal from the best of the veins, the coal in parallel veins is irretrievably lost, either in whole or in part by caving and crushing.

The demand for anthracite as a domestic fuel being urgent, and the supply being necessarily met from one limited region, arrest of production can hardly be permitted in order to study and supply improvements in methods of mining and preparation. This explanation may be accepted as a partial excuse for the waste of this rare and invaluable fuel. But no such justification exists for the waste of the by-products in the coking of bituminous coal; since the utilization of the waste gases, either as fuel alone, or as fuel for the recovery of certain by-products, was practiced long before the introduction of the Otto type of retort ovens, which is merely an amplification of the illuminating gas plant.

There is made in this country about 22,000,000 tons of coke, of which less than 2,000,000 tons are made in by-product ovens. The actual proportion is 5.4 per cent of the whole, while 94.6 per cent is made in non-by-product ovens. The coke is made from 34,000,000 tons of coal, from which about 1,500,000 tons alone yield by-products.

Average coal in its coking yields per ton as by-product about 20 lb. of ammonium sulphate, when the ammonia is recovered as sulphate, and 10 gal. of tar. If these by-products were recovered from all the coal coked, there would be saved about 340,000,000 gal. of tar, worth at $5 per ton $8,168,000, and ammonia sufficient to make 340,000 tons of ammonium sulphate, worth, at $60 per ton, $20,400,000; and allowing 60 per cent of the gas to be consumed in heating of the ovens, there would be available for power 140,000,000,000 ft. of gas, each cubic foot of which, if burnt, would yield about 500 B. T. U. of heat.

The total volume of gas now wasted, therefore, after thus deducting 60 per cent, would give us 72,000,000,000,000 B. T. U., and allowing 12,000 B. T. U. per horse-power hour, 6,000,000,000 horse-power hours, if burnt in gas engines—or far more than the power yielded by the Falls of Niagara. The figures of loss are startling and appalling. The tar wasted would enable us to outstrip Germany's famous lead in the manufacture of aniline dies, and other hydro-carbon products, if we brought Germany's perseverance and skill and chemical science to bear upon the industry. It would yield ammonia enough to require the multiplication of our acid and fertilizing works, making cheap manures with which to revive our depleted prairie lands, and power enough, if distributed, to create new centers of manufacturing activity.

If Germany can afford the expense of coking ovens of the retort type, with the object of making so good a coke out of her inferior coals that they can compete with our own in the markets of Mexico, surely we can do the same. And we would do so, were it not for the reckless haste to make money, and make it at once with whatever appliances we possess.

None are so willing as our own manufacturers to discard the old plant and replace it at any cost with new, but they hate complications; and therefore it will take time to persuade our coke manufacturers to complicate the simple process of coke making in the bee-hive oven—as long as it makes a good coke out of our splendid coals—with all kinds of chemical processes, and operated by chemical experts who are even more obnoxious than their processes.

But the gains are so obvious that prejudice must rapidly vanish, and we shall soon see two great changes taking place. More coke will be made at the works where it is consumed, for coal can be transported more cheaply than coke, on account of its lesser bulk, and it does not suffer in transportation, if intended for coking; whereas, coke loses in volume and efficiency by attrition in carriage.

If, moreover, the 25 to 30 per cent of volatile gases given off, even from the bee-hive ovens, are burnt, as they issue from the oven, under steam boilers, or, better still, exploded, after purification, in gas engines, the total weight of combustibles carried from the mine will be burnt either as coke in the blast furnace or as gas for the generation of power.

There may be furnace plants in localities where the by-products of the coke oven are valueless, though they are becoming fewer with the extension of our railroad system. But even so, it will generally be found cheaper to coke the coal at the furnaces where it is to be consumed and then utilize the escaping gases for power purposes, than to haul, on the same trains from the distant coal-fields, coal for generating power and the costly bulky coke already wastefully deprived of its volatile gases.

The utilization of the gas at the great centers of the coke industry, as in the Connellsville district, for the generation of power, would formerly have been impossible; but now, that long distance electrical transmission under high voltage has been practically effected, there is no excuse for wasting the energy which escapes from the gas from 25,000,000 tons of coal coked in Pennsylvania alone, where power is in such demand.

When Siemens introduced his gas producer he imagined the time would come when gas instead of solid fuel would be sent from the mine to the consumer. The conception has never materialized, for obvious reasons. But none of the objections which prevail against the transportation of gas hold good against the transmission of the more subtle mysterious agent—electricity.

And therefore, with the interposition of only one—or for certain purposes, two—conversions and transformations, we shall sooner or later see Siemens' dream realized, for the gas generated at the mine will be transmitted as electric energy to the consumer. And the smoke nuisance, the ash nuisance, and a host of other nuisances, will disappear from our cities and our homes.

The effect of the saving of waste on the price of our staple metals will be incalculable. In fact, when all the volatile products of the coke oven and of the blast furnace, which are now saved in Scotland, are deprived of their heat-giving properties, and their chemical constituents, and when the slag as well as the metal have returned their heat to man instead of to the atmosphere, and the slag itself has been turned into cement, or some other useful article, it will be a question as to whether the pig iron is the principal object of manufacture, or one of the by-products takes primal rank.

*From address given before the Michigan College of Mines, April 22, 1904.

COAL IN THE TRANSVAAL.—The report of the Chamber of Mines shows that in 1903 there were 24 collieries operating in the Transvaal, the total output being 2,258,284 tons in the Boksburg district. The largest operations were those in the Transvaal coal trust, which produced 249,617 tons at Brakpan and 102,350 tons at Springs colliery. The Clydesdale Company produced 218,430 tons in the Middleburg district. The Transvaal & Delagoa Bay reported 378,281 tons and the Witbank colliery 325,319 tons.

IRON AND STEEL IN SWEDEN.—The Swedish Iron Manufacturers' Association has published the following statement of iron and steel production in Sweden for the year, in metric tons:

	1902.	1903.	Changes.
Pig iron	524,400	489,700	D. 34,700
Iron blooms	183,600	191,300	I. 7,700
Bessemer steel	85,200	84,800	D. 400
Open-hearth steel	198,300	225,200	I. 26,900

There were in operation in 1903, a total of 98 blast furnaces, 292 puddling furnaces and bloom forges, 19 bessemer steel converters, and 46 open-hearth furnaces.

GERMAN POTASH SALTS PRODUCTION.—There has been continued improvement in the consumption of potash salts, as a result of the systematic propaganda, notably in America. The production in 1903 was as follows in metric tons: Muriate of potash (80 per cent), 19.539 tons; sulphate of potash (90 per cent), 38,407 tons; double manure salt (48 per cent), 22,296 tons; manure salt, 153,415 tons; kieserit, in blocks, 23,509 tons; crude potash salts, 1,513,935 tons. The exports to the United States were 71,279 metric tons muriate of potash, 19,747 tons sulphate of potash, 11,944 tons double manure salt, 59,655 tons manure salt, 233,619 tons kainit and sylvinit. Compared with 1902 the shipments to America show an increase, principally in kainit and sylvinit.

NOTES ON A TRIP TO WHITE OAKS, NEW MEXICO.

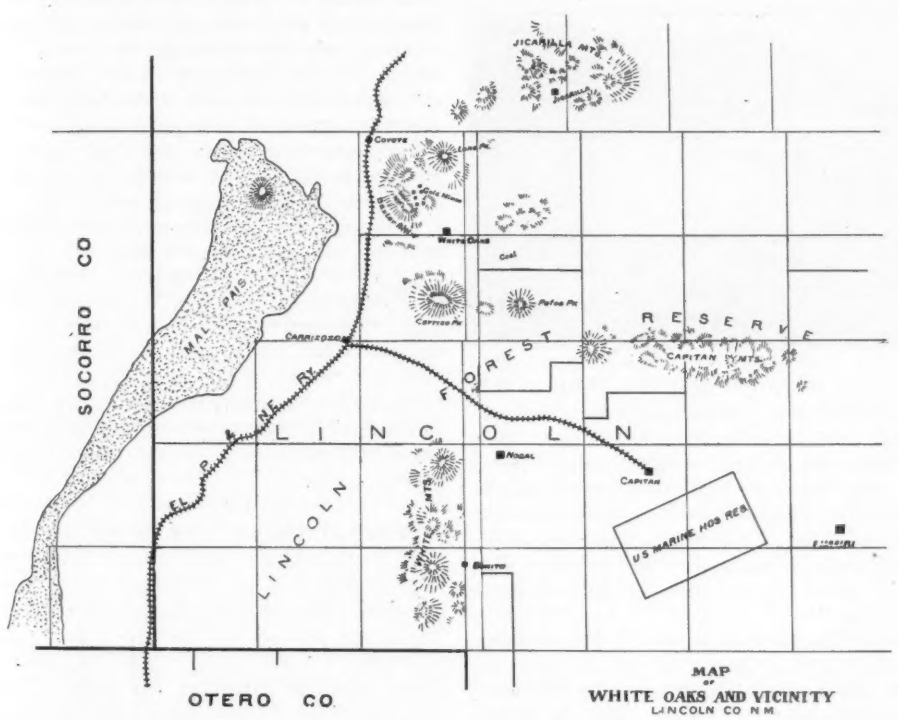
BY E. PERCY SMITH AND LEON DOMINIAN.

The mining camp of White Oaks, in the northwest of Lincoln county, is reached from Socorro by a road passing through San Antonio on the Atchison railroad. This town owes its importance to the fact of being the shipping point for the coal mined in the surrounding region. From San Antonio the road continues east over sandy hills up to the line of low mountains separating the plains of the Jornada del Muerto from the Rio Grande valley; it was somewhat further south that the early *conquistadores* hauled to Mexico City the output of the rich gold mines situated in what is now Santa Fé county; and the danger attending these expeditions was implied in the significant appellation of the Journey of Death, which the plain still bears. The precipitous western scarp of the Oscura mountains is then passed, and the northeastern prolongation of the chain is crossed. Beyond lie the "barren plains," large tracts of which are covered by basaltic flows of recent geological age. The whole cross-country trip from Socorro requires two full days on horseback.

White Oaks is situated 12 miles from Carrizoso station, on the El Paso & Northeastern branch of the Rock Island system. The town lies in a small valley surrounded by low mountains forming a distinct group which is north of the lofty White mountains, and rises above the barren plains, from which it is separated by a narrow cañon. Through this cañon the main road extends.

From White Oaks, roads radiate to neighboring localities; among which the coal-field of Capitan, about 20 miles southeast; Lincoln, the county seat, 28 miles in the same direction; Nogal, a gold and copper camp, 18 miles south; Jicarrilla, to the north, and the coal lands of Patos Peak to the east, are noteworthy. In common with many New Mexican mining centers, the entire region appears to have been known to prospectors and miners two centuries ago, at which time it is said that the Spaniards worked on the Jicarrilla placers.

Since the completion of the El Paso & Northeastern line, about two years ago, the district has acquired better transportation facilities, and although this is not of much avail at present, owing to the small amount of work done, it is expected that further mining activity will be stimulated by these improved conditions. Supplies are now hauled from Carrizoso, although fully four miles of haulage could easily be saved by having a freight station at the point where the old stage line to Socorro crosses the rails.



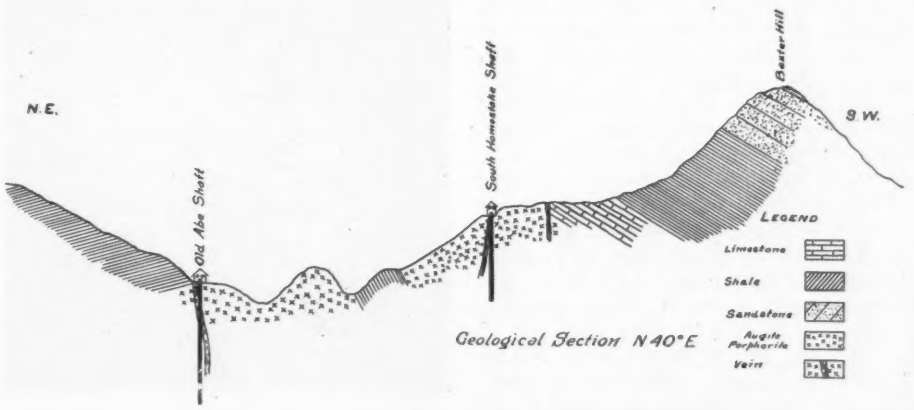
MAP
OF
WHITE OAKS AND VICINITY
LINCOLN CO N.M.

Although the camp has not yet suffered from lack of water, it is a question whether an adequate supply could be derived from the immediate vicinity, should extensive milling operations be undertaken. As it is, the town supply is obtained from wells sunk to a depth of 65 ft. The water is slightly alkaline, differing in this respect from that of the White mountains, where the accumulation of snow affords a perennial supply of good water. The importance of the water question in this portion of New Mexico cannot be overestimated. The scantiness and the poor quality of the fluid so far obtained is a serious drawback to development, but there seems to be no reason why good water should not be struck at a depth much in excess of that which has been attained up to the present time. It is owing to the limited means of the inhabitants of the region rather than to lack of a spirit of enterprise that attempts to bore deeper weel have not been undertaken.

The lowest series of strata exposed consist of calcareous shales, pierced here and there by dikes of augite-porphyrite. These are overlaid by sandstones, the greater portion of which has been eroded, it being found only on the tops of the environing hills. The accompanying section will serve to illustrate the main relations of the different formations.

The only fossils found were collected at a point one mile due east of the camp, in a gulch through which runs the Jicarrilla road. The fossiliferous beds consist of sandstones that may be correlated with those further west, and the specimens were referred to Cretaceous types.

West of the camp and at a short distance from the mines, successive lava-flows of different character bespeak the activity of eruptive agencies in the locality. The shales are typically of a dark blue color, and show signs of alteration within the proximity of the dikes. In the latter phases the color changes to a light greenish gray with the effect that the rock on first examination was thought to be a distinct formation. Immediately at the contacts these sedimentaries exhibit more marked alteration, being highly silicified and milky white. The augite porphyrite can be described as follows: In the fresh phase, the rock has a grayish purple color and a porphyritic texture. The ground-mass is cryptocrystalline, and encloses abundant phenocrysts of augite, varying in size from specimens hardly perceptible to the naked eye to crystals 1.5 in. long and 0.5 in. wide. Lath-shaped plagioclases could also be detected. Biotite is common and a little quartz is present. In many places the rock has been excessively decomposed, and is then softer, of a dirty greenish white color, most of the dark minerals having disappeared. An interesting fact consists in the alteration, *in situ*, of the large augite crystals to hornblendes. It is no unusual occurrence to find, in the altered mass, the outlines of the augite crystals; and, when these are of the larger dimensions cited above, numberless minute, acicular crystals of actinolite ostensibly occupy the place of the original augites.



The veins occur in the augite-porphyrite and contain gold-bearing pyrite. In the zone of oxidation, the chief product of the decomposition of the pyrite is a black botryoidal hematite, which can be seen disseminated throughout the altered dike-rock at the mouth of the Old Abe shaft.

An interesting, and probably unique, instance of the occurrence of native gold in gypsum is found in the Old Abe mine. The hydrous calcium sulphate occurs at the contact of the

shales and the augite porphyrite, and has probably been deposited from waters previously surcharged with sulphuric acid, passing through the shales and through the igneous rock. A specimen showed fine wires of gold in a slab of gypsum. It appears that at the time of the discovery of this small deposit, a specimen was sent to the Smithsonian Institute, in acknowledging the receipt of which the exceeding rarity of the occurrence was asserted.

The mines are situated about a mile northwest of the town of White Oaks, on either side of a ravine running northeast and southwest, with Baxter hill on the west. It was in this ravine that gold was first discovered in 1877. The placers, especially those just below the present site of the Old Abe mill, were very rich. The veins from which the gold had come were discovered two years later. Two placer miners named Wilson, while eating lunch, noticed some quartz carrying free gold, and located the North and South Homestake claims. The Old Abe and a number of claims on the line of the Homestake vein were soon afterward staked out, and then followed an excitement during which the whole country was taken up. When the time came for actual mining and milling, the machinery and supplies had to be freighted from San Antonio on the Santa Fé, a distance of over 80 miles, at a cost of 60c. per 100 lb. Notwithstanding these difficulties, the mines have been developed to a considerable depth, and the district has become one of the most important in the territory.

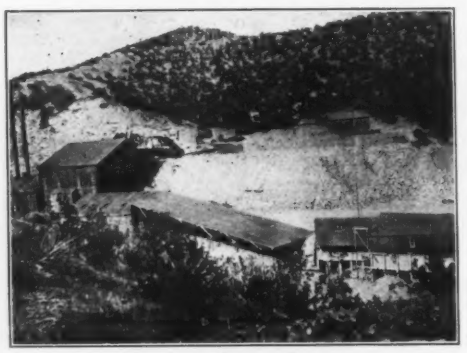
The following table will give some idea of this development and production:

Mine.	Depth of Workings.	Production.
Old Abe	1,400 ft.	$860,000
South Homestake	600 "	600,000
North Homestake	1,050 "	400,000
Little Mac.[1]	...	50,000
Rita[1]	900 " (on incline)	.....

[1]Data lacking.

The most important mine in the camp is the Old Abe. The old vertical shaft, 800 ft. deep, caved in 1886. Shortly afterward, the present working shaft was sunk to a depth of 200 ft. Then followed a period of inactivity; until, in July, 1897, the work of sinking to 1,300 ft. was begun, connections being made at intervals of 50 ft. with the old workings. The vein, dipping almost vertically, has an average thickness of from 4 to 18 in.; but at many points it shows great enlargement. One stope, known as the "fishpond," between the 700 ft. and 800 ft. levels, had a width of over 20 ft. and produced some very rich ore. There are a number of other stopes in the upper levels near the shaft which are from 10 to 15 ft. wide. From the position of the stopes a main chimney or pipe of ore is readily traceable, starting from the surface on the south side of the shaft and passing to the north side at about the 950-ft. level. Regarding the assay-value of the ore, no definite data could be obtained, owing to the fact that no records were kept by the management; and it is probable that tests were confined to panning. In general it may be said that in the upper levels, at least, the ore was high grade. The stopes, with the exception of those near the surface, are all open. They are timbered with stulls when less than 8 ft. wide; and, when wider, with square sets, all of which timber is native and obtained from Patos Peak. No attempt was made to fill with waste, because of the difficulty of sorting the ore underground and the absence of crosscuts.

The mine is peculiar in that no water, other than a little surface seepage, is encountered above the 1,300-ft. level. Water was struck in a winze sunk below this level, but was of so small an amount that it was pumped to the 1,250-ft. level, and allowed to soak into the walls from a sump at the northern end. The amount of development along the strike of the vein has not been over 500 ft. to the north, and somewhat less than this to the south. Some



OLD ABE MINE AND MILL.

of the wall-rock is exceedingly hard, and machine drills have been employed.

There are five mills at White Oaks. Three of these aggregate 50 stamps; one is equipped with two 5-ft. Huntingtons, and one with two ball pulverizers. The last mentioned machines were unsuccessful, and the mill in which they were placed became idle soon after its completion.

A brief description of the Old Abe 20-stamp mill will give an idea of the practice followed. The ore is dumped on two 4 ft. by 8-ft. grizzlies, set with 1.5-in. spaces. From the 'overs'

GULCH WHERE GOLD WAS FIRST DISCOVERED.

pieces of waste are removed on a sorting floor; and they then pass through a jaw-crusher, set to crush to 1.5 in., to join the fines in bins above the stamps. The stamps weigh 950 lb., have a 6-in. drop and a 6-in. discharge; they are run at 95 drops per minute, and crush through 40-mesh screens. After passing over the amalgamating plates, 5 by 10 ft., the pulp is treated on four Frue vanners, and the tailings pass on to five canvas tables, four being used constantly with one as an alternate. These tables are 6 ft. by 75 ft. with a slope of 1.75 in. per foot. The tailings from the canvas tables are treated in a 50-ton cyanide plant consisting of six 25-ft. vats, 6 ft. high.

The town and the mines have their own coal supply, obtained from seams outcropping near Patos Peak. The haul is not more than two or three miles. Operations have been confined to two properties; one of these, a tract of 320 acres, owned by Wells and Parker; and another, of 160 acres, belonging to the Old Abe Company, have been developed to a depth, on the dip, of not over 400 ft. It is a steaming and coking coal, the yield of the latter being about 60 per cent of its original weight.

Two analyses are given, one from each of these properties, and it will be noted that, aside from the rather high percentage of ash in that from the Old Abe tract, both would rank well among the western coals.

	Wells & Parker.	Old Abe.
Moisture	0.85 per cent	2.35 per cent
Volatile Matter	38.90 "	35.23 "
Fixed Carbon	52.70 "	49.93 "
Sulphur	0.70 "	0.61 "
Ash	6.85 "	11.88 "
	100.00	100.00

There are, in the immediate vicinity of White Oaks, a few copper and iron prospects, but the camp has been, so far, essentially a gold producer.

MINERAL PRODUCTION OF QUEBEC.

We are indebted to the courtesy of Mr. J. Obalski, mine inspector of Quebec, for the following statement showing the mineral production of the province for the year 1903. The quantities given are in tons of 2,000 lb., except where otherwise stated in the table. The values given are at the shipping point, or point of production:

	Quantities.	Value.
Magnetic and titanic iron ore	112	$300
Bog iron ore	12,035	34,985
Chrome ore	3,020	45,300
Copper ore	26,481	109,875
Asbestos (crude or fibre)	29,261	916,970
Asbestic	9,906	13,292
Mica (thumb trimmed)	145	74,119
Ochre (calcined)	1,746	20,440
Feldspar	20	37
Sulphate of baryta	440	2,640
Phosphate	1,187	8,214
Gold (ounces)	55	1,000
Slate (squares)	5,510	22,040
Flagstone (square yards)	3,000	2,550
Cement (barrels)	40,000	66,000
Granite	.....	160,000
Lime (bushels)	1,000,000	140,000
Bricks (number)	120,000,000	625,000
Stone	.....	530,000
Total value	.....	$2,772,762

Asbestos.—The shipments of asbestos given above are classed as follows: First class crude, 930 tons, valued at $117,847; second-class crude, 2,354 tons, value $227,919; fiber, 9,650 tons, value $311,248; paper stock, 16,327 tons, value $259,956.

Mica.—The shipments of mica are divided, according to sizes, as follows: 1 by 2 in., 20,382 lb., valued at $1,019; 1 by 3 in., 131,085 lb., value $17,120; 2 by 3 in., 67,245 lb., value $18,632; 2 by 4 in., 46,304 lb., value $19,639; 3 by 5 in., 18,942 lb., value $11,649; 4 by 6 in., 4,646 lb., value $3,535; 5 by 8 in., 2,020 lb., valued at $2,525.

Copper Ore.—There was a production of 23,644 gross tons of low-grade copper ore, valued at $109,875, of which 14,770 tons have been shipped to the United States and the balance, say, 8,874 tons, used at Capelton for sulphuric acid making.

Pig Iron.—There were 9,636 tons of charcoal pig iron made, valued at $230,639; using 20,646 tons of ore, of which 10.746 tons of bog ore were from this Province, the balance coming mostly from Ontario.

THE VALUATION OF GOLD MINES.

By H. C. HOOVER.

As in a former article, this discussion is limited to that class of gold mines the continuity of which in depth is uncertain.

If a broad survey be made of the method of valuation of mines in different countries, by different peoples or by different individuals, there will be seen to be the widest divergence in the point of view. The pendulum of valuation swings between a minimum, as represented in the demands of the American engineer for a purchase price to exceed but little, if any, the actual exposed profit in sight, and an extreme maximum allowed by some representatives of the English mining investor, who find the value by capitalizing the possible dividends at a somewhat higher rate of interest than Government bonds.

The whole of this wide variation in theory and practice results from a different attitude toward that portion of the value of a mine which must be assessed to extension in depth. The one extreme allows but a few feet, while the other practically ignores the essential characteristic of mining investments—the necessity of recovering capital coincidently with an interest which compensates for the risks taken.

Were we to stick strictly to the minimum figure, but little business would take place, and but few funds would be available for expansion of the industry. There is an inherent speculation in mining, and it is this speculation which attracts; without speculation for large returns but little gold mining would be done. I think it is certainly true that mines on average yield a much greater profit than the minimum stated. On the other hand, it is obvious that the maximum value which one finds only too often assessed on stock markets by a process of multiplication of dividends, is simply gambling.

Various proposals have been made to meet this divergence of view; usually they are attempts to give a rule to the speculator or investor, by which he may on average measure his mine. Every mine is so much a problem in itself that all generalization is difficult, but any sound method which calls the attention of the investor to the real basic facts of valuation and tends to keep him on the right track is useful.

The favorite method of blending the extremes has been to add a proportion to the profit in sight. In a recent issue of this JOURNAL, it is advocated that in general a mine is worth 50 per cent more than the net profit in sight, or, in other words, the extension in depth is, on the average, worth this amount.

My friend Mr. J. H. Curle, working on somewhat the same basis, in outlining a theory of sound investment in mining shares, says in effect:[1]

1st. The development in the bottom must be good;

2nd. The mine must pay 10 per cent per annum;

3rd. There must be 60 per cent of the price of the shares in sight.

In other words, with favorable geologic conditions, Mr. Curle estimates in general that extension in depth is worth 40 per cent of the whole value, or 66 per cent of the profit in sight.

I take it that these schemes of valuation refer only to the safety of the original capital, and do not include interest thereon, it being considered that the profit of the transaction shall arise from the possibilities beyond recovery of capital. I am not disputing the possibility of thus covering the necessary profit, but there seems something wanting where there is no expressed basis for calculating the time, etc., to gain a certain interest as well as recovery of capital.

Theoretically, at least, any scheme of valuation of extension in depth based upon ratio of ore reserves, or profit in sight is wholly wrong. The quantity of ore in reserve is a matter of management not necessarily dependent on the size of the mine. A mine may have a reserve so large as to imply an extension in depth beyond all reason, or, on the other hand, a mine may be extremely valuable, with no profit in sight at all. No mine starts with an ore reserve, and upon this basis of mine valuation the whole of prospecting ventures would be eliminated from legitimate mining. This basis of valuation also fails to take into account the great variability in geological character between different mines and different districts, in relation to probabilities of extension in depth. Moreover, if I am right in the "economic limit" of ore-reserves, as stated in a previous article to be in the most cases from two to three years output, then, owing to the limited reserves thus permissible, if we estimate the value at, say, 50 per cent more than such reserve, the majority of mines would yield, on above footings, from 20 per cent to 40 per cent per annum.

Inasmuch as the value of the mine is dependent (outside of the reserve profit) upon the distance that the deposit will extend in depth (or, in rare cases, laterally) beyond the region of vision, the most logical basis for estimation would be a computation of how far such extension is necessary to justify a given value, or to what depth the particular deposit may be risked to so extend; in other words, the depth of extension should be considered instead of a proportion of the profit in sight. By such a method not only would broad generalizations be avoided, but a sort of geological basis would be found. The general character and experience of the district for continuity; the special conditions of each particular deposit as to size of ore-bodies; the known factors, such as bore-holes; the development on adjoining mines, and the possibilities outside of immediate ore-bodies, etc., would all come into play in the probabilities assessed. These factors are glossed over on any system of proportional values.

An example of the working of these methods of estimation may be taken, for instance, by grouping the leading mines in West Australia. A group of 15 mines in that State is at this date valued on the London market at £14,500,000. They have profit in sight of £10,500,000. Upon a basis of adding 66 per cent to the profit in sight, these mines are about correctly valued. To recover the capital sum represented above, they will have to extend something like 250 ft. below the present bottoms, and to repay capital, and, say, 6 per cent interest during the whole period, they must extend about 480 ft. below their present bottoms. This depth is not an unreasonable risk, taking all matters into consideration. On *average* over the whole group, the two bases of valuation agree fairly well, but, taking "A" mine, for instance, with an ore-pipe 30 by 90 ft., an extension of 480 ft. is very problematical indeed, and even more so in the case of the "B" mine, composed of lenticules of ore by no means certain, even laterally; yet in "C" mine, with two parallel ore-shoots, each 1,000 ft. long and 12 ft. wide, with the adjoining mine proved already 600 ft. deeper, even a longer life could be granted.

Taking a leading mine in the Kolar district in India, valued by the market at £3,600,000, in which profit in sight is roughly £920,000, the proportional valuer would assess it to be worth about £1,450,000. This sum of £1,400,000 would not only be recovered, but also with interest, by an extension of 200 ft. further in depth. With a continuous run of ore 3,500 ft. long, and the general geological conditions favorable, there would seem to be warrant for confidence to considerably greater depth than such a valuation would grant.

In the detailed judgment as to the probability of extension in depth, as stated above, other conditions being equal, the size of the ore-body becomes the greatest factor. An ore-body 1,000 ft. long is much more likely to extend than one 10 ft. long. That such extension is absolutely proportional, I should, of course, not contend. An old Cornish saying was that an ore-body would extend in depth a distance equal to its length. This, although it shows an appreciation of the matter from experience, does not meet the case in ore-shoots, whose general character implies greater depth than length, nor does it meet the case for partially exhausted mines.

In depth, deposits seldom terminate abruptly. The lenticularity of ore-shoots is generally recognized, and that ore-shoots usually, in their terminals, display lenticular character is, I think, generally accepted.

If this could be established on average—a worthy problem for mining geologists—it would be possible to state roughly that the minimum extension of an ore-body or ore-shoot in depth would be a factor of not less than a radius of one-half its length. By length is not necessarily meant horizontal length, but a section perpendicular to the downward axis. By study of 72 mines with whose ore-bodies I have been able to familiarize myself, I find this rule of minimum to apply in all cases but two, by taking a number of points from top to bottom of the workings. Subject to wider expression of experience, I believe that an amount of ore thus represented could be about as safely assumed as can the continuity of values through ore-reserves blocked out. I do not propose this as a method of determination, either of maximum or minimum value, but as a possibly useful yard-stick in forming a judgment. For instance, in the "C" mine, cited above, having an ore-body 1,000 ft. long, by such a calculation, if we assume that the ore-body is about to die out, and that the bottom workings represent a cross-section of the lens, the minimum depth would be 500 ft. or an average of the whole section of the ore-body about 275 ft. This distance, when compared with the necessity of ore-body to extend only 200 ft. to return the present market price and only 480 ft. to return the price and interest, would indicate that the present price is fairly sound.

In general, the proposal is that this class of mine should be valued at (a) the profit in sight; (b) a further amount based upon the extension in depth of the ore-body (in volume and values as disclosed at its lowest section) for a distance based upon the probabilities in each particular mine, instead of the rough and ready method of a proportion of profit in sight.

[1] *The Economist* (London), September 5, 1903.

FAULTING IN THE GLOBE DISTRICT.*

An observer standing upon the top of Webster mountain and looking northward or eastward over the hilly country spread out before him, will be struck with the apparent chaotic distribution of the various rocks, as indicated by their respective and characteristic tints in the landscape. Here and there patches of limestone gleam white through the thin screen of scanty vegetation, while areas of quartzite are indicated by a reddish color, and masses of diabase by a dull olive tint. The beds show no trace of folding, and the eye seeks in vain for any persistent or regular structure that may account for this rocky patchwork. A similar view is obtained on looking southeast from the steep southeastern slope of the Pinal mountains over the region just outside of the Globe quadrangle. Here, however, the structure has more regularity, and the manifold repetition of beds of white limestone overlying reddish quartzites, all dipping gently to the southwest, is at once suggestive of faulting.

FIG. 1.—FAULT, ONE MILE EAST OF PINTO CREEK.

That this suggestion is, in fact, the clue to the dominant structure becomes evident upon closer study. In traversing this faulted region, one steps with bewildering frequency from quartzite to limestone, granite or diabase, the line of separation being often clearly defined by a fault-breccia forming a bold outcrop (Fig. 4) that may be followed over the country for miles. Few equal areas of the earth's surface have been so thoroughly dislocated by an irregular network of normal faults, and at the same time exhibit so clearly the details of the fracturing. A rather inadequate conception of the extent of this regional shattering may be had from the sections given in Fig. 2 and 3. The faults there shown, however, are merely those which attain some structural importance, and the numerous little fault-blocks that they bound are themselves cut by faults far too many and too closely spaced for representation. For a considerable part of the northwestern portion of the district the term 'regional brecciation' most aptly expresses the actual conditions there found.

The majority of the faults have throws of less than 100 ft., and their marked influence upon the general structure of the region is dependent, as a rule, rather upon their enormous number than upon great individual displacement. In spite of much variety in strike and dip, the general result has been to drop by successive steps toward the northeast, beds having a general southwesterly dip, the throws of the faults being such as to offset the effect of the dip which would otherwise be effective in rapidly carrying the strata above or below the present erosion surface. It is due to these faults of generally moderate displacement that the Globe limestone, for example, retaining in most cases a southwesterly dip of from 20° to 40°, is scattered broadcast in small areas.

Much of the structure of the region is partly dependent upon faults which no longer appear as distinct dislocations; these are generally, however, planes of later faulting frequently in part coincide, as in the case of the Old Dominion fissure. See Fig. 2.

In most regions of diversified topography underlain by stratified rocks the dominant structures are due to folding, modified by faulting. In the Globe quadrangle, on the other hand, the structure, where not traceable directly to the effect of igneous intrusions, is the result of faulting, while folds are either entirely absent or represented by an occasional gentle and structurally unimportant buckling of the strata occurring in some fault-block.

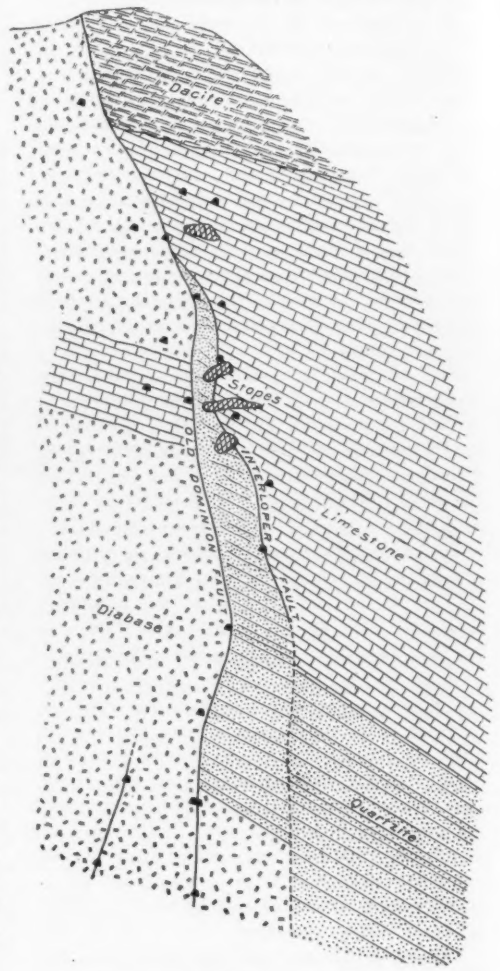


FIG. 2.—OLD DOMINION FISSURE.

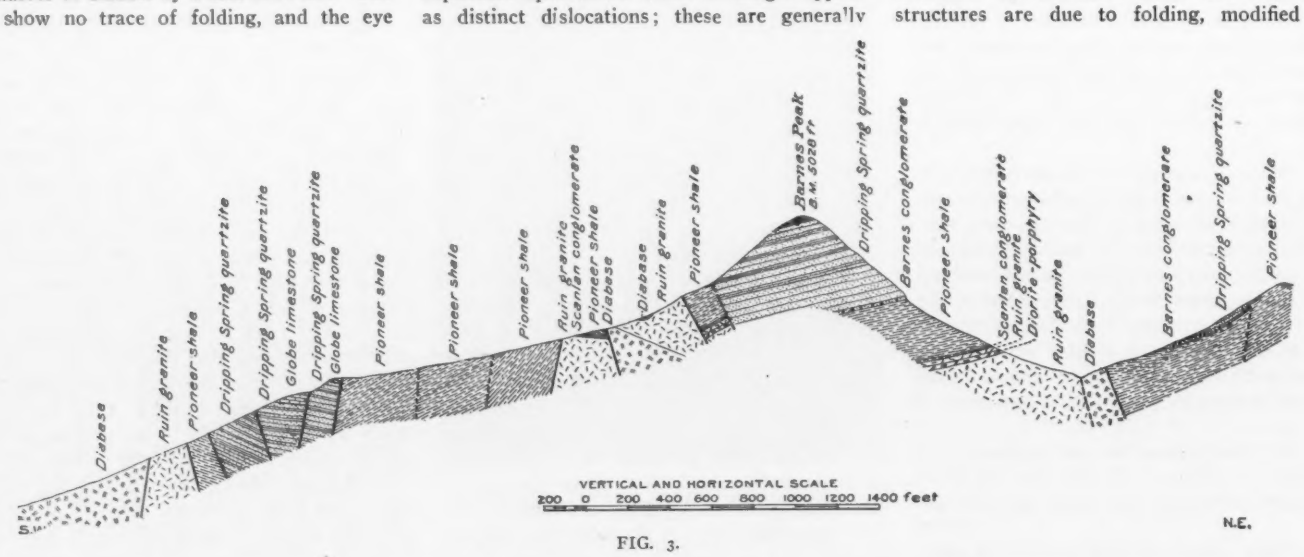


FIG. 3.

The faults may usually be traced by the aid of a fault-breccia. Such a breccia is invariably present where quartzite of the Apache group forms one or both walls of the fissure. It is northwesterly or northeasterly fractures which immediately preceded or accompanied the great diabase intrusion, and which, from their close connection with this event, may be conveniently distinguished as intrusion faults. They became channels for dike-like connections between the sills, and were important factors in determining the form of the molten mesh in which the blocks of strata were inclosed. Most of the surfaces of dislocation were transformed to eruptive contacts, with which, how-

*Abstracted from 'The Geology of the Globe Copper District, Arizona,' by Frederick Leslie Ransome. United States Geological Survey, 1903.

commonly made up of angular fragments of quartzite, with occasionally rounded pebbles dragged in from some conglomerate bed dislocated by the fault, the whole being embedded in a rusty matrix of silicious detritus, cemented by iron oxide. Sometimes fragments of diabase, schist, or other rocks traversed by the fault are mingled with the quartzite, and in a few cases, where faults cut Pinal schists, the breccias are composed entirely of fragments of

FIG. 4.—FAULT-BRECCIA.

this rock. But by far the greater number of the fault-breccias in the region consists chiefly of crushed quartzite. These quartzitic breccias are frequently so indurated as to be more resistant than the rocks on either side, and they then outcrop boldly as ragged walls stretching across the country. Examples of such indurated breccias are abundant over the northern half of the quadrangle. One forms a conspicuous crag by the roadside about four miles northwest of Globe (Fig. 5). Another (Fig. 4) separates limestone from diabase on the northwest side of Big Johnnie gulch.

Frequently the faults bring into juxtaposition rocks unequal in their resistance to disintegration, and a scarp of topographic prominence results from differential erosion. The region affords many examples of these, one of the best being shown in Fig. 1, where hard quartzites of the Apache group are normally faulted against crumbling granite. Such scarps are of purely erosional origin, depending upon the relative hardness of the rocks and not upon the throw of the fault.

Faults wholly in diabase or limestone are rarely conspicuous. Their courses in the former rock are marked by zones of brecciation stained black by oxide of manganese and mineralized with salts of copper. The passage of a fault through limestone may produce brecciation, which, however, is likely to be so healed by re-crystallization of the calcite as to be detected with difficulty, as in the case of the Old Dominion fault north of the Hoosier shaft.

While only a small proportion of the faults are perceptibly mineralized, many of them have been prospected, and the study of the region is indebted to that remarkable instinct which guides the impartial pick of the prospector to the discovery of fissures, irrespective of the wealth or poverty of their mineralization.

The evidence for the existence of intrusion faults associated with the diabase eruption is of a more general character than that of the later faults directly traceable on the surface. In a few instances the diabase can be observed in undisturbed eruptive contact with a regular surface of dislocation cutting across the bedding. But in other cases later movement has taken place along this contact, and the original character of the latter is inferred from the petrography of the diabase near the fissure and from the demonstrable inadequacy of the later faulting to account for all of the continuous structures. Taking, for example, the Old Dominion fault, we find that the diabase of the foot-wall exhibits the texture characteristic of this rock near its original intrusive contacts. Furthermore, the existence of an included block of limestone in the diabase of the foot-wall is unexplainable if the relation of the diabase foot-wall to the limestone and quartzite hanging-wall be supposed wholly due to faulting of later date than the solidification of the eruptive rock. Lastly, even if the limestone in the foot-wall be disregarded, the general geological evidence indicates that the faulting subsequent to the diabase intrusion has been of too moderate displacement to account wholly for the relative position of diabase foot-wall and limestone hanging-wall. Thus the dacite in the upper workings of the Old Dominion mine shows a throw of less than 100 ft., a displacement wholly insufficient to explain the juxtaposition of diabase and limestone observed in the lower levels.

The dominant faults of the Globe quadrangle fall into two groups, (1) those having a generally northeast-southwest trend, and (2) those striking approximately northwest and southeast. Although faults belonging to these two groups have effected the most conspicuous structural results, they are associated with countless other fissures running in all directions and adding greatly to the complexity of the fault network. It has proved impossible to reduce the subordinate fractures to distinct groups or systems, and when it is remembered that for every dislocation shown upon the geological map there are several others unrepresented, and that the faults are of different ages, the reason for failure is apparent. The region has not been dissected with mathematical precision along determined lines, but has been shattered by complex geological forces to an extent that is only less defiant of analysis than is a pane of shivered glass.

Among the many hundreds of faults occurring within the quadrangle are a number in which the character of the relative movement is not clearly shown, either because the dip of the fault is unknown or because the original geological horizons of the rocks adjacent to the fissure are in doubt. The majority of the faults, however, are clearly normal, while indubitable cases of reversed or thrust-faulting are unknown.

The earliest dislocations distinctly recognizable are those associated with the post-Carboniferous intrusion of diabase. From the close of this period of revolutionary eruptive activity to the probably Tertiary outbursts of dacitic lava one process only—that of erosion—has left a fairly legible record. It is believed, however, that important faulting also took place during this interval, and that some of the fissures which do not at present cut the dacite, and particularly those showing mineral-

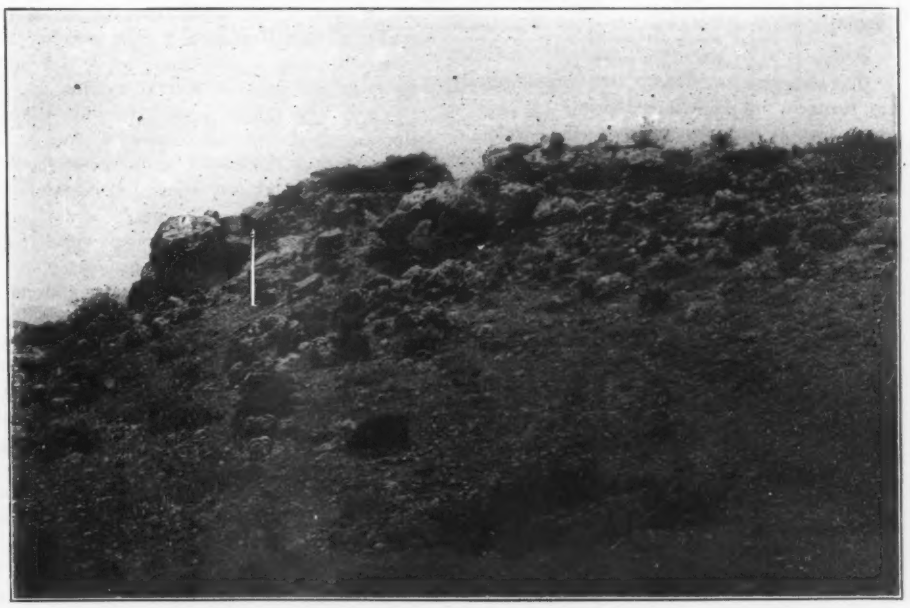


FIG. 5.—FAULT-BRECCIA BETWEEN LIMESTONE AND DIABASE.

ization, are actually of pre-dacitic age. The evidence for this belief is drawn from observations tending to show that the original sulphide ore of the district is older than the dacite. The last great faulting of the region followed the dacitic eruptions, and involved their lava in the final geological mosaic. The age of this fissuring which blocked out the existing structure of the country is not definitely known. As it occurred after the dacite eruptions and before the accumulation of the Gila conglomerate, it may provisionally be referred to the latter part of the Tertiary. Its results can not always be distinguished from the earlier faulting that followed the diabase intrusions and preceded the eruption of dacite. Faults once initiated have remained planes of weakness along which there has been a revival of movement with each successive period of dislocation.

LAKE SUPERIOR IRON ORE MOVEMENT.

Statistics collected from the various Lake Erie dock managers by the Cleveland *Marine Review* show that on May 1 the stocks of iron ore at Lake Erie ports were greater than on the same date in any year in the history of the trade, the amount being 4,534,103 gross tons. This is not surprising, as furnaces were well supplied when navigation closed and the curtailment of pig iron production by banking and blowing out resulted in a large decrease in the demand for shipments from docks during the winter. The following table shows the stocks on docks on May 1, 1904, with the amounts on the same docks on December 1, 1903:

Ports	Dec. 1. 1903.	May 1, 1904.	Changes.	
Toledo	106,710	160,216	I.	53,506
Sandusky	95,275	68,863	D.	26,412
Huron	253,249	208,008	D.	45,241
Lorain	288,581	237,404	D.	51,177
Cleveland	1,337,750	968,508	D.	369,242
Fairport	845,946	579,677	D.	266,269
Ashtabula	1,911,911	1,559,028	D.	352,883
Conneaut	591,364	128,018	D.	463,346
Erie	657,409	474,275	D.	183,134
Buffalo	282,890	150,106	D.	132,784
Total	6,371,085	4,534,103	D.	1,836,982

The decrease in stocks represents shipments to furnaces in the winter season. It will be seen that at one port, Toledo, the stocks increased during the closed season; probably by late cargoes, arriving after December 1. The total shipments to furnaces from Lake Erie ports for the years ending May 1 were as follows for six years past, the open season including the period from May 1 to December 1, when navigation was open; the winter covering the period from December 1 to May 1, when shipments were from dock stocks:

	Open season.	Winter.	Total.
1899	9,059,829	3,063,153	12,122,982
1900	12,073,224	3,809,657	15,882,881
1901	11,613,773	2,854,487	14,468,260
1902	14,204,596	3,011,469	17,216,965
1903	18,423,364	3,481,887	21,905,251
1904	16,903,013	1,836,982	18,739,995

The stocks remaining on docks on May 1, for the six years, were as follows:

1899	2,073,254	1902	2,848,194
1900	1,720,656	1903	3,592,367
1901	3,050,183	1904	4,534,103

These statements do not cover the entire trade in Lake Superior ores, as they do not include the ore shipped to South Chicago, Milwaukee and other ports on Lake Michigan; nor do they include the movement by rail, which is, however, only a small part of the total.

Jet, a variety of lignite, the *gagates* of the ancients, is largely used for mourning ornaments.

THE LAKE COPPER REGION IN 1903.

By OUR SPECIAL CORRESPONDENT.

Final returns are now in from all the Lake Superior copper mines. Production in the calendar year 1903 showed a gain of 22,718,182 lb. of refined copper, or 13 per cent. The following table gives the output of the lake district in detail for the calendar years 1903 and 1902, in pounds:

Mine.	1902.	1903.	Changes.	
Calumet & Hecla	81,248,739	76,490,869	D.	4,757,870
Quincy	18,988,491	18,498,288	D.	490,203
Osceola	13,416,396	16,059,636	I.	2,643,240
Tamarack	15,961,528	15,286,093	D.	675,435
Baltic	6,285,819	10,580,997	I.	4,295,178
Champion	4,165,784	10,564,147	I.	6,398,363
Trimountain	5,730,807	9,237,051	I.	3,506,244
Wolverine	6,473,181	8,999,318	I.	2,426,137
Mohawk	908,479	6,284,327	I.	5,375,848
Atlantic	4,949,366	5,505,598	I.	556,232
Franklin	5,259,140	5,309,030	I.	49,890
Adventure	606,211	3,295,657	I.	2,689,446
Isle Royale	3,569,748	3,134,601	D.	435,147
Mass	2,345,805	2,576,447	I.	230,642
Winona	101,188	1,036,944	I.	935,756
Arcadian	500,000	.....	D.	500,000
Michigan	133,373	275,078	I.	141,705
Phoenix	.....	202,823	I.	202,823
Centennial	74,667	.....	D.	74,667
Miscellaneous	.....	100,000	I.	100,000
Total	170,718,722	193,436,904	I.	22,718,182

The production by the Lake Superior mines during the past ten years has been as follows, in pounds:

1894	114,526,555	1899	155,845,786
1895	129,740,765	1900	144,227,340
1896	144,058,524	1901	155,507,765
1897	145,839,749	1902	170,718,722
1898	156,669,098	1903	193,436,904

Previous to 1890 the production of fine copper by lake mines never reached 100,000,000 lb. in any year. In the two years succeeding 1900 production increased 23 per cent; then followed two years of smaller output. In 1895 there was a gain of 15,000,000 pounds and steadily increasing returns were shown until 1898. Then followed two years of declining production, until, in 1901, there was a gain of over 11,000,000 lb. In that year the district showed the larger productive capacity brought about by the opening of new mines. The output of these new properties was over 5,000,000 lb. in 1901, upwards of 20,000,000 lb. in 1902, while in 1903 it exceeded 47,000,000 lb. This year will show a good gain, but it will not be so large as expected several months ago, because of the strikes which curtailed the production of the Quincy, Baltic, Champion and Trimountain mines. The increase for 1904 may reach 15,000,000 lb., and it certainly will amount to 10,000,000 lb., nearly all of which will come from the mines opened since 1897.

The Calumet & Hecla is producing at virtually the same rate as last year, and no increase is expected until the stamp mills at Lake Linden are completely reconstructed, which will not be for two years. The Quincy should show better results this year, improvements at the stamp mill and the introduction of electric haulage at the mine having greatly increased the facilities for handling rock. Osceola showed a good gain in 1903, and will probably make an even larger product this year. It is reaping the benefits of large expenditures, covering several years past, for the modernizing of its equipment and the exploitation of its North and South Kearsarge mines.

Tamarack is now producing on the smallest scale for several years. The mine will increase its output during the latter half of the year, as the facilities at No. 5 shaft will then be ample for handling double the present rock supply. The closing of No. 2 shaft several weeks ago for repairs may prevent an increase for the entire year. Baltic, Champion and Trimountain, the three big south range properties, will show increased returns this year. The Wolverine has reached its capacity, but will continue to make copper at the rate of 9,000,000 lb. per annum for a long time.

The Mohawk made the largest relative gain of any of the big new mines in 1903, and will show a gain of 40 to 50 per cent this year. It has completed its third stamp, and will install a fourth next year. Atlantic, which long possessed the undesirable reputation of being the lowest grade mine in the Lake field, is more than holding its own. Increased depth has resulted in a richer grade of rock.

Franklin will be shipping from its new No. 2 shaft at the Junior branch this summer, enabling it to furnish rock for its fourth stamp, installed at the mill several months ago. The Adventure is simply producing enough to keep things going while the mine is explored at greater depth. Isle Royale lost one of its shafts late in 1903, and no increase is to be expected in its output this year.

The Mass Consolidated, in Ontonagon county, is making some money and the directors meet at the mine this month to decide upon the opening of "C" shaft. Winona started using one head at the Atlantic mill late in 1902. Its output this year will be about the same as last year. The Michigan secured a lease of one head at the Mass mill late last year, operating it single shift. It is now running day and night, and this year's output will be about 1,500,000 lb. of fine copper.

The Phoenix will turn out about 1,250,000 lb. of ingot copper this year, having only been fairly well started late last year. Centennial expects to be stamping 500 tons of rock per day by July. The Ahmeek has secured one head at the Tamarack, but will not furnish a very large production this season.

COST OF MINING COAL IN GERMANY.

Figures recently published by the Harpen Coal Company, one of the largest coal producers in Germany, give some interesting statements of the cost of producing coal. The total coal raised from the company's collieries in 1903 was 5,150,622 metric tons; of this 3,539,000 tons were sold as coal, and 1,476,000 tons were sent to the coke ovens. The coke made was 1,128,000 tons, showing a consumption of 1.31 tons of coal in making one ton of coke; a somewhat lower proportion than is usual in this country. The average production per man employed was 0.877 ton per day. The average daily wages of all employees were 93.5c., a decrease of 8.3c. from the previous year.

The average cost of mining and preparing coal in 1903 was as follows, per ton:

	Cents.	Per cent of total.
Wages	132.80	74.9
Timber	18.80	10.6
Water	1.43	0.8
Haulage	3.34	1.9
Miscellaneous	8.33	4.7
General expenses	12.61	7.1
Total	177.31	100.0

The cost of making coke, not including the cost of the coal used, was 50.69c. per ton.

The consumption of coal in operating the mines varied very much. The lowest proportion to the total mined reported at any of the company's collieries was 0.5 per cent at the Hugo; the highest was 8.8 per cent at the Gneisenau. The general average was 3.8 per cent. The number of days worked at the different collieries varied from 237 to 307, the average being about 276 days.

CONCRETE WORK ABOUT MINES.*

By HENRY W. EDWARDS.

Concrete, with well-proportioned ingredients, may be safely relied upon for a crushing strength of 50 tons per square foot. The ingredients are crushed stone, sand, cement and water. The stone is usually crushed to pass a 2 to 2.5-in. ring; soft stone, such as decomposed porphyry, is objectionable, unless the concrete is to bear a light load. Slag broken to the same size is in every way suitable; it has only one objectionable ingredient, namely, calcium sulphide. The broken stone or slag is not improved by screening. Jig tailings, both coarse and fine, give good results when used for sand; a mixture of all sizes, with 0.05 to 0.09 in. predominating, being best. Vanner-tailings and stamp-battery tailings are usually too fine. Granulated slag is excellent. As regards cement, the so-called natural cements, while cheaper in first cost, are usually less effective than portland cements. Any doubt as to whether a particular sample of cement is natural or artificial can usually be settled by testing for magnesia. In portland cement this is present as an accidental impurity, about 2 per cent, while in natural cement, it sometimes exceeds 10 per cent. Generally speaking, concrete containing two parts of portland cement equals three parts of natural cement. Cement should be finely ground, but not to exceed 100-mesh. In testing through wire-cloth of this fineness, it is important to see that the meshes of the sieve have not been distorted, allowing coarser material to pass. There is a marked difference between various brands of portland cement, and these differences are accentuated by age and care in storage.

Tests of the tensile strength of cement are easily made by the machine shown in the accompanying drawing; it is simply an ordinary 5-ton platform scale, with a good, strong screw-jack; the pressure exerted by the screw-jack is read on the beam of the scale at the moment cracks appear on the visible sides of the test piece. A series of mixtures should be made with each brand of cement, these mixtures being rammed in a wooden box 9 in. square by 30 in. long, and left there for several days, or weeks, until set. Many tests should be made of each series of mixtures, these mixtures ranging from one part of cement with 0.5 part of sand or tailings and seven parts unscreened crushed rock, to one part of cement with four parts of sand and three parts of rock.

Concrete may be divided into three classes, according to the work required of it; (1) strong, containing about 15 per cent of cement, for retaining-walls, flues, culverts, arch work in general, and foundations in wet places: (2) medium, containing about 10 per cent of cement, for engine, machinery, stack and furnace foundations, on good, dry ground, and for the bottoms of flues; (3) poor, containing about 7 or 8 per cent of cement for leveling the bottoms of excavations previous to beginning foundations proper, and for all foundations and below-ground work, where the weight to be supported will not exceed 6 tons per square foot. Both medium and poor grades may be diluted further without diminishing the ultimate strength, by using large boulders, provided the concrete is properly tamped.

In testing, it is only necessary to work on some of these varieties, usually the strong. One or two blocks of each series may be tested at the end of a week, leaving the others to be tested at the end of four weeks. Any block which stands a 2-ton breaking test can be pronounced very good, although a 4-ton test is not too much to expect after several months' drying.

It is to be noted that two parts of sand, four parts of crushed rock, and one part of cement mixed together do not give six volumes of mixture, as the sand fills the spaces between pieces of rock, and the cement those between the sand and rock. On thoroughly ramming this concrete in place it will pack to a bulk of four volumes, or, approximately, the original bulk of the crushed rock.

Generally speaking, machine mixing is better than hand mixing, and it will pay to install a mixer, if more than 80 cu. yd. is required. An efficient mixer is a cubic wooden box, lined with No. 10 sheet iron, and having an iron manhole at one corner. The box is mounted on two trunnions, one a piece of 3-in. pipe through which water is introduced, the other connected by a gear-wheel and pinion to a hand crank. The box is given a few revolutions to mix the ingredients dry, the necessary quantity of water is introduced by a hose and nozzle through the hollow trunnion, and then the box is revolved as long as desired. Ideal mixing is to have each particle of rock and sand coated entirely with cement. In hand mixing by shovels, a sheet-iron platform lightens labor.

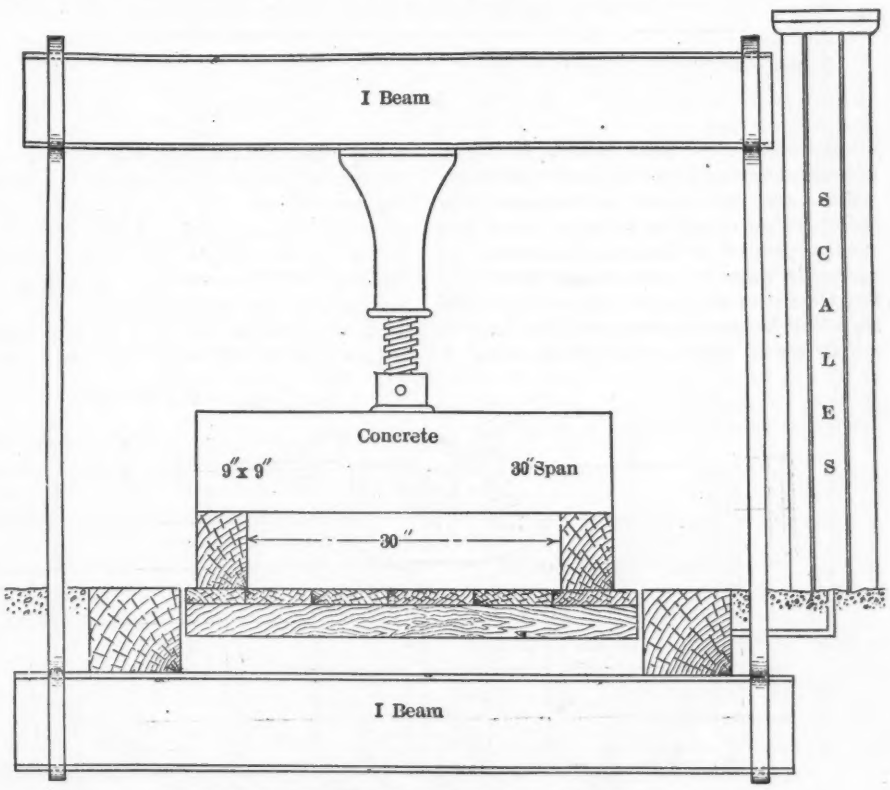
The necessary amount of water depends upon the climate, the character of the other ingredients, and the intended use. A good rule is to have the concrete so wet that it will shake like jelly when being rammed by a heavy beater, but in shallow layers, as in floors, the mixture should be much wetter than when laid in mass, otherwise it will dry up before chemical action begins. In retaining walls, it is well to use the mixture reasonably dry, since as excess of water, on evaporation, leaves the concrete porous. For tanks, reservoirs, etc., the mixture should contain more concrete, and should be more thoroughly mixed and tamped.

Concrete should be mixed as near the point of use as possible, and a long trip in a wheelbarrow is to be avoided. Where it must be handled by wheelbarrow, it is best to dump the material on a small platform and shovel it over, before putting it in place. Care should be taken that all parts are equally wet; otherwise some portions of the work may dry before others, and thus cause cracks.

For foundations and walls, the material should be laid in layers, not over 6 in. deep, to get the full benefit of beating. A convenient beater is made of an iron casting 6 in. square, with a handle of 1 or 1.5-in. pipe about 5 ft. long, the whole weighing 20 to 25 lbs. Each layer should be put on before the previous one is set, and not more than a half-hour should elapse between mixing and depositing. It is advantageous to have the work continue day and night, but, if interrupted, the layer that has set should be cleaned and wetted first with water, and then with thin cement grout, before adding a new layer. As vertical joints in a wall are less weakening than horizontal ones, a long retaining wall may be divided into panels, each of a size that can be completed in a day's work.

The making of cribs or forms permits much ingenuity. They should be stiff enough to stand the beating of the concrete, and so arranged that the timber may be used repeatedly. Plain 2-in. planks, with straight planed edges are better than tongue-and-groove boards. In filling behind such a crib the concrete should never be dumped from a height, else the mortar and stone will separate. In a deep excavation the concrete may be lowered in a tub or bucket and dumped in place.

The time required for seasoning varies with



METHOD OF TESTING CONCRETE BLOCKS.

*Abstract of a paper on 'Concrete in Mining and Metallurgical Engineering' read before the American Institute of Mining Engineers, February, 1904.

the climate and the season of the year. In summer, or in a dry winter climate, the action is rapid, and a covering of moist sand may be necessary to prevent too rapid hardening. In northern climates with cold winters, concrete laid in the fall will not be really solid until warm weather sets in. Where the load is to be applied gradually, as in a retaining wall filled from behind, loading may begin after a week or two of warm weather. For thin work, such as floors and flues, a few days may suffice; an engine foundation can be used after a week or two. In heavy masses, hardening and seasoning may go on for many months.

For work under water, a home-made iron funnel, with a stem long enough to reach bottom and cut off as necessary, is useful. By resting the outlet of the funnel on the bottom, filling the stem and hopper with concrete, lifting a little and moving as desired, the concrete can be spread evenly. In running water, a cofferdam, slightly higher than the depth of water, may be made out of a double layer of boards, with a layer of tarred roofing paper between. The ground upon which the foundation is to rest is leveled roughly, and the cofferdam is carefully sunk into position by loading it with concrete. This is much cheaper than pumping out the water and laying the concrete in the usual manner; it is cheaper also than sheet piling.

It is difficult to give any definite figures of cost, owing to the great variation in the price of the ingredients in different localities; also, the size of the work is a factor. Presuming, however, that the materials are delivered in railroad cars convenient to the work, I find that an average cost covering unloading, mixing, arranging platform, placing and beating is approximately equivalent to a cubic yard of structure per man per day. This covers incidentals, such as wear and tear on tools, etc., but not the cost of cribs, excavations, scaffolding, lumber, etc. The cheapest piece of work of which I have record, is a retaining wall 16 ft. high, 92 ft. long, and 3 ft. thick at the base, tapering to 20 in. at the top. Jig tailings and picking-belt rock available on the spot were used, while cement cost $2.15 per bbl., lumber $14 per 1,000 ft., and wages were 15c. an hour. The total cost was 22c. per cu. ft., including supervision. A large engine foundation of hand-broken slag, granulated slag and cement cost, including crib, $7.75 per cu. yd. of finished work.

Imitation meerschaum is made by adding glue to gypsum, which forms stucco plaster.

THE HANCOCK JIG.

By F. DANVERS POWER.

This jig is the invention of Mr. H. R. Hancock, formerly manager of the Moonta and Wallaroo mines, in South Australia, and is of the reciprocating screen type. Fig. 1 is a plan of the screen, which is suspended and free to move in the hutch. Fig. 2 is a side elevation of the jig. Fig. 3 is an end elevation. Fig. 4 is a plan of the mechanism under the hutch.

The screen *a* moves freely up and down backward and forward in a large rectangular hutch *b*; below the hutch is situated the mechanism that actuates the screen. These jigs are made in three sizes, the length of screen being 12, 16 and 20 ft. respectively, and their capacities from 50 to 75, 100 to 150, and 200 to 300 tons per 24 hours, the capacities naturally varying with the relative specific gravities of the minerals treated, and also the degree of fineness to which it is necessary to crush material so as to free the ore from the waste. the capacity of a coarse jig being greater than that of a fine one. The hutch for a 20-ft. screen is 24 ft. long, 6 ft. deep, and 4 ft. 6 in. wide; it rests on cast-iron standards *k* about 4 ft. high, which are bolted to a wooden or masonry foundation. The hutch is divided into six compartments of gradually increasing

Fig. 1. PLAN OF SIEVE.

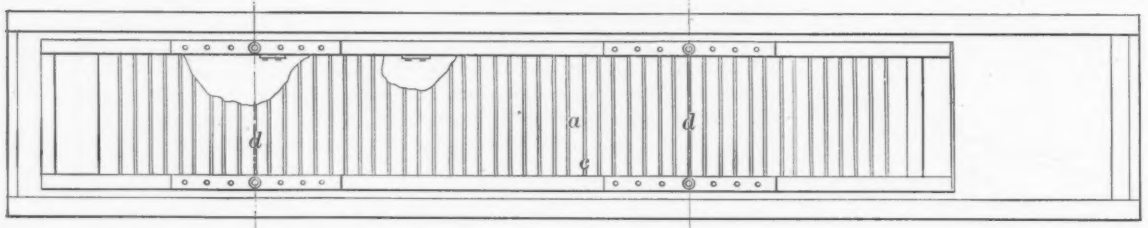
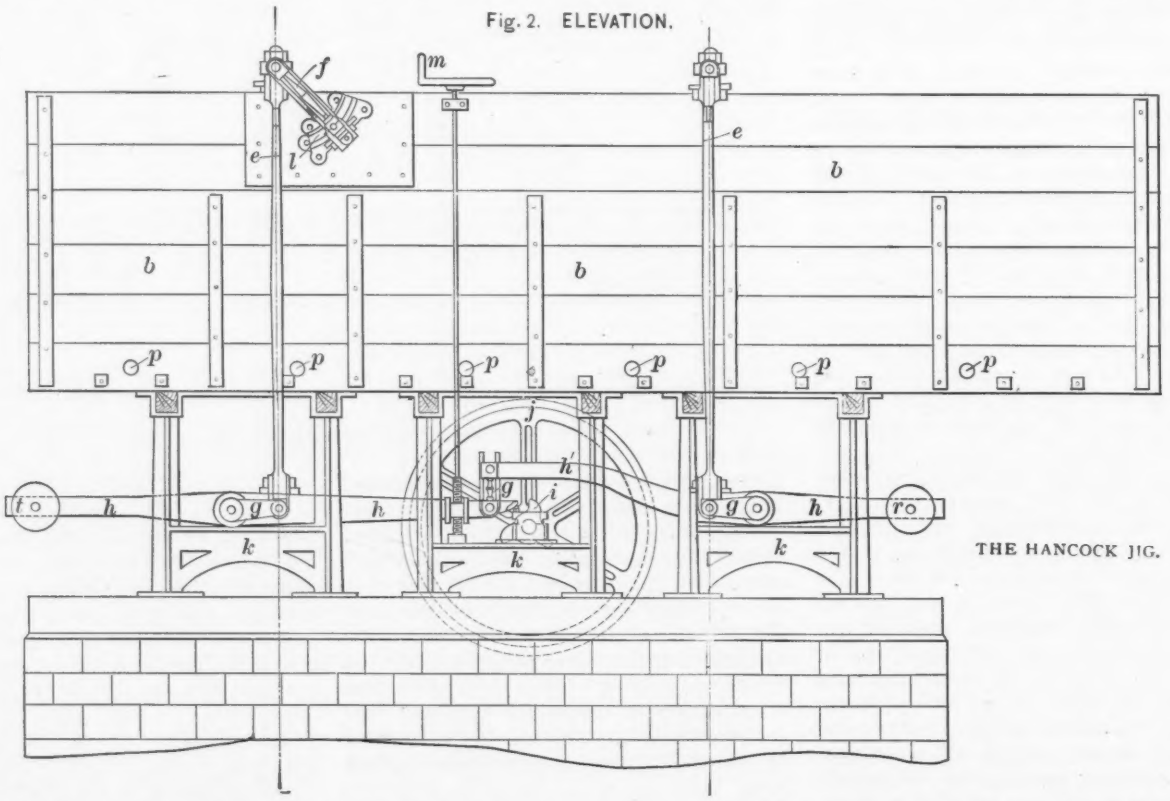


Fig. 2. ELEVATION.



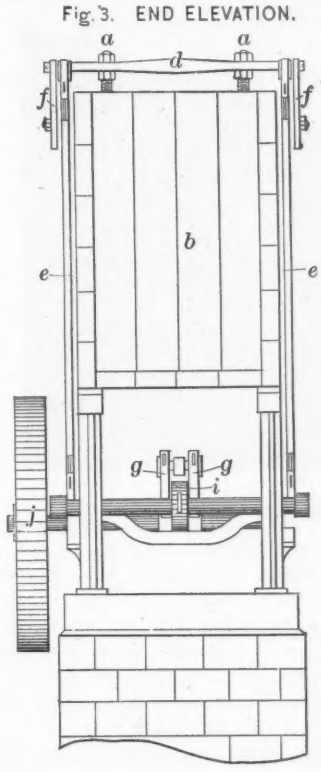
THE HANCOCK JIG.

lengths, in which are deposited the different grades of concentrates. The screen is one long tray, hung so as to be slightly lower at the tail end than at the head. The screen varies according to the nature of the ore to be treated, generally 16 to 25-mesh. Above the screen are placed several wooden strips *c*, 3 in. deep and 0.5 in. thick, placed 3 in. apart, which divide the tray into compartments. Each compartment is filled with iron punchings or pieces of heavy ore of a suitable size. The screen frame is connected by tee bolts *n* to two cross bars *d*, each of which is joined to two side-rods *e* outside the hutch. The lower ends of the side rods *e* are fitted to cranks *g* below the hutch. The revolving three-lifter cam-wheel *i*, worked by the cam-shaft *o*, from the belt-pulley *j*, raises the balanced lever *h*, which in turn actuates a similar lever *h* at the other end of the machine by means of the links *q*, to which they are connected. These levers, which have adjustable weights *r* at their ends, are connected with the cranks *g*, and so give motion to the screen. The cam-wheel generally makes 60 rev. per min., which means that the screen has 180 pulsations during that period; but the speed may be varied to suit the requirements.

The value of the machine is largely due to the compound motion given to the screen, for at every pulsation, when the screen is usually raised 0.25 to 0.375, the screen is also given a forward and backward running motion of about the same extent. The movement in either direction is easily varied to suit the class of material dealt with; the horizontal motion is obtained by means of the links *f* at the top of the hutch. One end of these links is connected with the cross-bar *d*, while the other is fastened to the quadrant *l* attached to the side of the hutch. This movement can be easily regulated by sliding the adjustable link *f* in the quadrant *l*. The screw-regulator *m* controls the amount of throw the screen receives. The power required to work the jig is from 1 to 1.5 horse power.

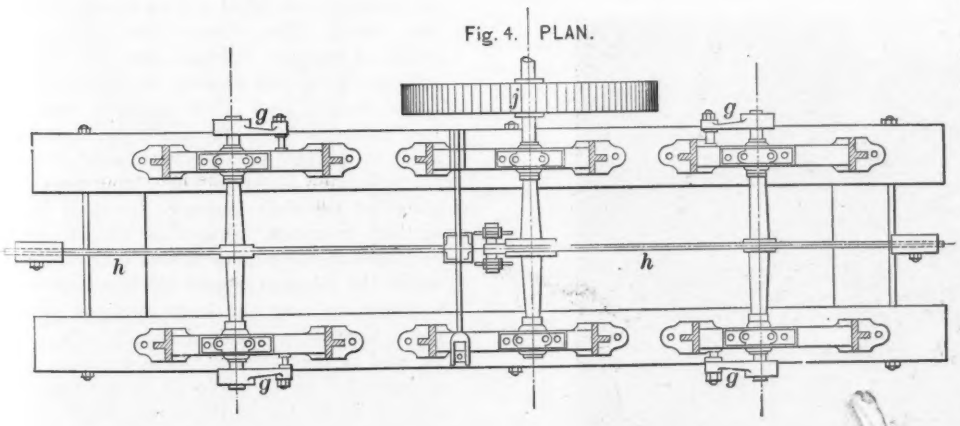
This style of jig may be used for concentrating coarse or fine ore; in the former case the concentrates pass away through an adjustable gate running across the screen, one at the end of each division; in the latter case, the concentrates pass through the screen into their respective compartments in the hutch. The products of the first, second, and sometimes the third compartments consist of concentrates, while the middlings collected in the other compartments are generally returned to the jig, either with or without re-crushing. The separation begins as soon as the pulp is fed onto the head of the screen, the heaviest mineral being deposited in the first compartment, while the balance is moved forward to be still further graded by the motion of the sieve, assisted to some extent by the slight fall in the screen. The tailings are carried over the lower end of the screen into a special compartment, which is emptied either by a valve or a small bucket elevator; the other products have their exit through the passages *p*. It

Fig. 3. END ELEVATION.



being desirable that as little slime as possible should be fed into the machine, it is found advisable to place a slime separator, such as Warren's, an Australian invention, at the head of the jig. This separator consists of a revolving inverted cone 4 ft. in diameter at the top, inside of which is placed a stationary scroll-shaped scraper from the top edge of the pan to near the center, arranged in such a manner that the coarse material passes over the top of the pan near the higher end of the scroll, while the slimes flow over the top of a central drum which has four holes at the bottom through which the slimes escape. The hutch is kept nearly filled with water, and preferably a moderate stream is allowed to flow through it while at work; but this is not absolutely necessary, as it is found that the compound motion of the sieve moves the material forward, and, in places where water is scarce, this jig is being used successfully without any flow other than that required to carry the concentrates and tailings out of the various compartments, no water whatever flowing over the top. Water is admitted at the side of the jig under the screen, the slight pressure thus obtained is found to give buoyancy to the material under treatment, and prevents slimes settling with the concentrates. The sources of water-loss are absorption, evaporation and leakage. The two latter can be almost avoided with proper care. At a mine in the northern part of South Australia, where water was scarce, the total loss of water when using dry ore was found to be 50 gal. per ton of ore treated.

Fig. 4. PLAN.



These jigs have been largely used for treating ores of copper and lead in Australia, such as at Moonta, Cobar, Broken Hill, etc. At Moonta, ores crushed to pass through a sieve of 20-mesh, which contained 2 to 4 per cent copper were concentrated up to 19 and 20 per cent copper, at a cost of 5d., or 10c., per ton for jigging.

AN ANTHRACITE COAL WASHERY.

The report of Mr. Heber S. Thompson, engineer of the Girard estate, says that the largest washery on the estate is that known as the Schuylkill No. 1, which is at work on the culm banks deposited at the William Penn colliery, and is operated by the North American Coal Company as lessee. This washery worked steadily throughout 1903, and made large shipments, amounting to 174,087 tons of marketable coal, which is as much as some of the larger collieries on the estate. The output for the year averaged 661 tons per day of nine hours. The quantities and percentages of the different sizes which made up this tonnage are as follows:

	Tons.	Per cent.
Stove	8,401	4.8
Chestnut	17,082	9.8
Pea	25,473	14.6
Buckwheat	63,322	36.4
Rice	48,515	27.9
Barley	11,164	6.4
Culm	130	0.1
Total	174,087	100.0

Naturally, the proportion of the small or steam sizes was much greater than that of the domestic sizes; nevertheless, it will be seen that 14.6 per cent of the coal shipped was stove and chestnut. This is an unusual proportion for a washery.

The culm banks are being very thoroughly cleaned up as the work progresses. They are washed down by hydraulic process, the culm being carried by the streams of water to the conveyors. Four conveyors, having an aggregate length of 1,080 ft., are used in carrying material to the foot of an elevator tower, which raises the material to the top of the washery house. In the washery an auxiliary screening plant, consisting of a set of rollers and a shaking screen, has been placed, in which the material is ground up, partially sorted and picked over for slate before it goes into the washer. The steam plant was enlarged during the past year by two tubular boilers having a rated capacity of 150 h. p. each.

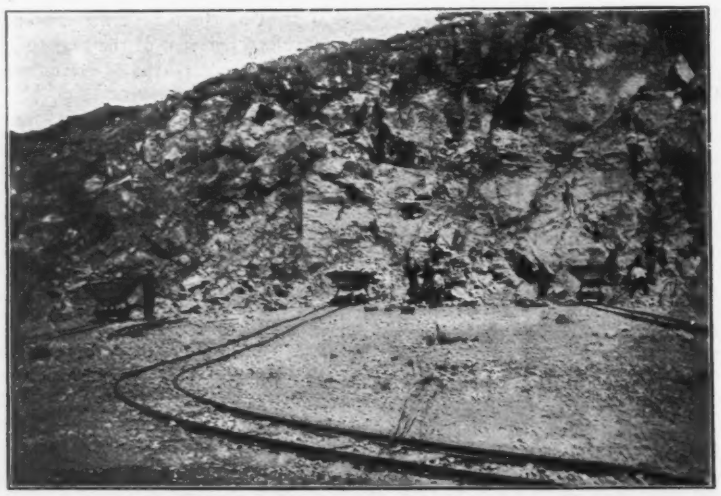
At another washery on the estate, at Raven Run, the system of hydraulic mining and conveyors has been abandoned, and the material is now loaded up into cars by a steam shovel. The cars are then hoisted by wire rope up a plane to the top of the washery. This system, it is believed, will facilitate the cleaning up of the culm pile close to the ground.

A QUARRY RAILROAD.

The accompanying illustrations show a complete industrial railway installed and equipped by Arthur Koppel, of New York, in a cement quarry. This railway consists of 25-lb. rails spiked down to wooden ties for the permanent road, and 16-lb. portable track for use in transporting the rock, where quarried, to the permanent road. The portable track is made in sections, each weighing about 250 lb., and mounted on steel ties, so that it can easily be laid, without any previous preparation of the ground, no excavation being necessary, and can readily be moved from place to place as required. Eight switches for use with this portable track were also furnished. These switches are made as standard in two different lengths, 9 ft. and 15 ft., to match track, and for 12-ft. radius and also for a radius of about 30 ft.

There were also furnished 30 standard steel side-dump cars, dumping to both sides, each with a capacity of 1.5 cu. yd. These cars were fitted with Arthur Koppel's patent roller bearings, which effect a large saving in haulage power over cars fitted with ordinary axle boxes. These bearings are practically dirt and dust proof, but can readily be cleaned when necessary. There is also a considerable reduction in consumption of oil, as none is required for lubrication, only just sufficient oil being put into the bearings to prevent the rollers from rusting. All this material was for their standard narrow gauge of 23.625 inches.

This system of narrow-gauge railways is suitable for all classes of manufacturing, mining, building, contracting, etc., and now, when competition is so sharp that every cent that is saved counts, the man who knows how to handle his material in the quickest and cheapest way is always ahead of the one who has not studied this matter, for the reason that the finished product costs him less, and he gets just as much for it as the other man who is not as well equipped. A large saving can be made and materials can be handled quickly, economically, safely and systematically by installing a railroad of this class, where there is any considerable quantity of material to be moved.



PERSONAL FREEDOM.

President Eliot of Harvard recently said. well, that: "The love of freedom is so ingrained in modern civilized society that the abridgement of personal freedom is everywhere recognized as an obstacle to the winning of either private or public happiness. The surrender of personal freedom to an association is almost as great an obstacle to happiness as its loss to a despot or to a ruling class, especially if membership in the association is compelled, and the association touches the livelihood. Secondly, the hope of improving one's lot is indispensable. This is a hope which the modern State and the modern Church have encouraged the free peoples to cherish. Thirdly, stability is indispensable. Civilization depends on the abandonment of nomad life and the permanent settlement of families where they can live in security and with trustworthy means of livelihood and of education. Fourthly, good-will is indispensable. There can be no such thing as public happiness in a community where the different elements of the State are in a chronic state of warfare or of mutual distrust."

THE KENNEDY IRON MIXER.

We are indebted to the Cleveland *Iron Trade Review* for the description of a new spherical mixer for molten pig iron, which has been designed and built by Julian Kennedy, of Pittsburg. Two of these mixers have been installed in the South Chicago works of the Illinois Steel Company, and two at the Newburg plant of the American Steel & Wire Company. In most of the mixers in use the splashing of the metal has the tendency to form skulls which are costly to remove. To overcome this and other difficulties the Kennedy mixer was designed. Fig. 1 is a side elevation of the mixer, the charging ladle and the cover-operating mechanism. The spherical mixer is provided with parallel circular tracks or flanges on or near its bottom, one on each side, on which it can be rolled for the purpose of bringing its discharging spout in the proper pouring position. By making the mixer spherical, its strength is greatly increased, and a minimum of material is used in its construction. The charging hopper is another novel feature, the molten metal being poured from above and delivered substantially in the middle of the pool of metal the mixer contains. By this method the splashing of the metal is obviated as far as possible and a fruitful source of skulling is prevented. The metal, when thus poured, also mixes more readily with the molten pool of metal, and provides a more uniform material for the converters.

Fig. 2 shows the construction of the mixer—an exterior metal shell and an interior refractory lining. The exterior shell is made of plates in sections, stamped into the required spherical form, and on each of the sides there is an annular band *A* of cast-steel, made in four united sections, although it can readily be made in a single piece. These annular bands not only serve as splices for holding the metal plates of the shell together, but their lower sections constitute rockers or rollers which rest upon the support or rolling surfaces *B* on which the mixer is tipped. This construction is cheap, as only the lower sections of the bands have to be machined and the others can be used as they are cast. The pouring spout is indicated by *C*, while *D* is the charging opening in the top of the mixer, which, when the mixer is in the normal position, as shown in Fig. 1, is directly above the central portion of the metal pool. For the purpose of rolling and tipping the mixer a cylinder or motor *E* is used, which is pivotally connected to the vessel, as shown in Fig. 2, and which, on being actuated, causes the mixer to roll on the surfaces *B*. Relatively little power is required for actuating this cylinder. The charging opening has a cover indicated by *F* mounted upon tracks, which are fixed to the top of the mixer. It is operated by a chain, passing over

a pulley *G*, and connected with a hydraulic cylinder *H*. At the rear end of the cover is another chain *J*, which passes over a pulley on the mixer, and another pulley on a stationary support which is provided with a counterweight *K*. When the mixer is to be charged with metal from the ladle, the cylinder *H* is operated, thereby drawing on the chain and

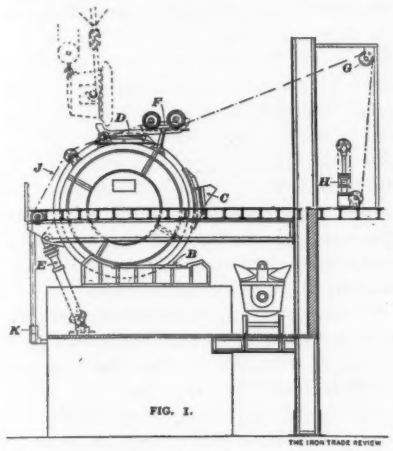


FIG. 1.

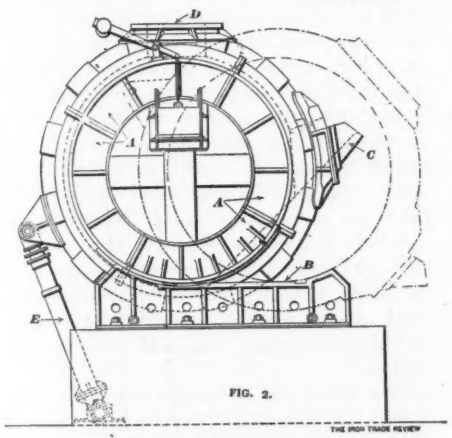


FIG. 2.

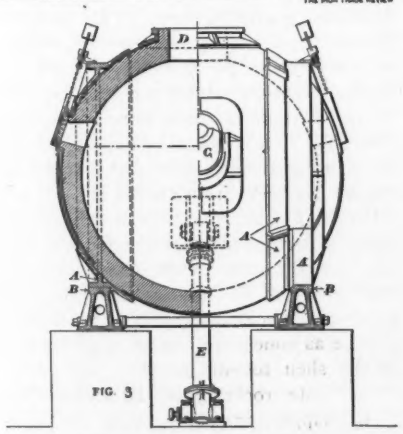


FIG. 3

KENNEDY IRON MIXER.

moving the cover on its track away from the charging opening. When the water is exhausted from the cylinder *H* the counterweight *K* restores the lid to its position over the hopper, and during the tilting of the vessel the counterweight will hold the lid in place in every position of the mixer. By reason of the spherical shape the mixer is heated uniformly by the molten metal which it contains. There are no corners for the lodgment of skulls and the heat of the metal is preserved in the most effective way. Fig. 3 is a front view, one-half being shown in vertical central section.

'Wocheinite,' a variety of bauxite, received its name from its occurrence at Wochein, Germany.

RECENT LITERATURE ON ECONOMIC GEOLOGY—XIV. MANGANESE ORES.

By Edwin C. Eckel.

Manganese Ores of the Cartersville District, Georgia. By C. W. Hayes. *Bulletin* 213, United States Geological Survey; p. 232.

A brief discussion of the Georgia manganese ores, which are so closely associated with the iron ores in the Cartersville and other Georgia districts. The principal point brought out is a modification of the theory advanced by Penrose to account for the origin of these ores. "Dr. Penrose holds the view that some at least of these deposits existed in their present form in the rocks of the region before weathering, and are therefore strictly residual. While this may be true in a few cases, the writer has found no evidence of it in the field; and the manganese ores are regarded, like the iron ores with which they are associated, as purely secondary deposits, their distribution being determined chiefly by chemical and physical conditions, rather than by the outcrop of beds especially rich in manganese."

Geological Relations of the Manganese Ore-Deposits of Georgia. By T. L. Watson. *Transactions* American Institute of Mining Engineers, advance reprint; pages, 47.

The manganese deposits of Georgia occur only in the northern part of the State, in the areas covered by crystalline and Paleozoic rocks, no manganese ores having yet been found in the Coastal Plain region. The deposits of commercial importance are still more limited in distribution, being confined to the Paleozoic area in the northwestern corner of Georgia. The most important deposits at present known are those situated near Cartersville, Rome, Cave Springs, Cedartown and Drake-town.

In this district the manganese ore-deposits occur in the material derived from the decomposition of various Cambro-Silurian formations, being associated with the Weisner quartzite, the Beaver limestone and the Knox dolomite. The ores are associated more or less intimately with deposits of brown hematite, ocher and bauxite; but the genetic relationship between the manganese and other ore-deposits is not close.

Mr. Watson accepts Penrose's theory in regard to the origin of the manganese ores, with certain modifications. The immediate source of the manganese ores of the deposits was the manganese disseminated through the formations in whose débris the deposits now occur. This disseminated manganese was concentrated, not by segregation in the original rock, but by the action of surface waters. Acidulated surface waters dissolved the manganese, and re-precipitated it in the decomposed material.

It will be noted that this theory presented by Mr. Watson differs from that of Penrose only in that the latter believed some of the ore-bodies to have been formed in the original rock, before its decay. It is to be further noted that precisely this modification of the Penrose theory was suggested by Hayes in 1900 (*Transactions* American Institute of Mining Engineers, Vol. XXX, p. 419) and reiterated in 1903 in the brief paper by Hayes reviewed above.

In discussing Mr. Watson's paper, Catlett differs from him in regard to this very point, stating that some of the manganese deposits in Virginia, when followed down below the zone of rock decay to fresh rock, seem to occur along a definite plane of stratification, apparently part of the original bedding

BOOKS RECEIVED.

In sending books for notices, will pubishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the Engineering and Mining Journal.

A Text-Book on Static Electricity. By Hobart Mason. New York: The McGraw Publishing Company. Pages, 156; illustrated. Price, $2.

The Annual Catalogue of Purdue University, Lafayette, Indiana, 1903-1904. Lafayette, Ind.: Published by the University. Pages, 240.

Les Trusts, Vue d'Ensemble. By André E. Sayous. Paris, France: published by the Société de Receuil Gal. des Lois et des Arrets. Pamphlet, 16 pages.

The Movable Base. By A. C. Cunningham, Civil Engineer, U. S. N. Annapolis, Md.: reprinted from *Proceedings* of the United States Naval Institute. Pamphlet, 16 pages.

California State Mining Bureau. Bulletin 31. *Chemical Analyses of California Petroleum.* By H. N. Cooper. San Francisco: published by the Bureau. Sheet, with 61 analyses tabulated.

Report of the United States Commission of Fish and Fisheries, 1902. George M. Bowers, Commissioner. Washington: Government Printing Office. Pages, 550; illustrated.

Seventeenth Annual Report of the Bureau of Industrial and Labor Statistics for the State of Maine, 1903. Samuel W. Matthews, Commissioner. Augusta, Me.: State Printers. Pages, 228; illustrated.

The Circulation of Underground Aqueous Solutions and the Deposition of Lode Ores. By John W. Finch. Denver, Colo.: published by the Colorado Scientific Society. Pages, 60; illustrated.

Register of Mines and Minerals of Kern County, California. Prepared by the State Mining Bureau; Lewis E. Aubury, State Mineralogist. San Francisco: published by the Bureau. Pages, 24; with maps. Price, 25 cents; postage, 8 cents.

BOOKS REVIEWED.

Foundry Nomenclature. The Moulder's Pocket Dictionary. Compiled by John F. Buchanan, London; E. & F. N. Spon, Ltd. New York; Spon & Chamberlain. Pages, 225; illustrated. Price, $2.

This little volume is an attempt to gather up the terms in general use among foundrymen and to set forth their definitions and technical applications. As the author explains, many of the words and phrases currently employed in foundries are not clearly understood, others are used in a loose way, and there are many also that have only local significance. In all some 2,000 terms have been found which need some explanation. As a supplement to the dictionary there are various memoranda, rules and tables relating to foundry practice as well as brief notes on methods, appliances, materials and metals, making it a very useful guide to the foundry industry.

California State Mining Bureau. Bulletin 31. Chemical Analyses of California Petroleum. By H. N. Cooper. San Francisco; published by the Bureau. Sheet, with 61 analyses tabulated.

Those interested in the oil-fields of California will value this bulletin just issued by the State Mineralogist and prepared by H. N. Cooper, chemist, giving chemical analyses of California petroleum. It is *Bulletin No. 31*, and is being distributed gratuitously. It is in tabular form and covers samples from all the producing fields. Samples were taken direct from the pumps by a specially appointed field assistant of the Bureau. All details of situation, ownership, name of well, formation, depth, daily yield, time operated, thickness of oil sand, etc., are given in each case. In addition the chemical features of each sample are stated, such as specific gravity, flash-point, viscosity, per cent sulphur, calorific value of dry sample, calorific value per cubic centimeter. It also gives details of distillation, amount of asphalt, etc. The methods by which the chemical analyses were made are also given in detail.

Metallurgical Analysis and Assaying. By W. A. Macleod and Charles Walker. London, 1903; Charles Griffin & Company, Ltd. Pages, 318; with numerous cuts in text. Price (in New York) $4.

Most of the text-books on assaying that have been adopted in mining schools are of advanced type, requiring thorough training in qualitative analysis and more or less knowledge of quantitative work, before they can be used intelligently as guides. The present volume is an attempt to present the whole subject of metallurgical analysis and assaying, so far as it needs to be followed by the average student, in a systematic manner, leading by gradual steps, from the first simple lessons and laboratory experiments, up to the technical methods employed by the modern metallurgical chemist. It would seem that such a plan is practicable, and one which should commend itself to teachers. The book shows evidence of careful preparation, both in regard to the selection of matter and to arrangement. As outlined, the course covers a period of three years; the first year's work includes simple experiments in qualitative analysis, the second being devoted to advanced qualitative and quantitative analysis, and the third year to technical analysis and assaying.

Missouri Bureau of Geology and Mines. Volume I. Series 2. The Geology of Miller County. By Sydney H. Ball and A. F. Smith. With an introduction by E. R. Buckley, Director. Jefferson City, Mo.: State Printers. Pages, 204; with maps and illustrations.

Few States in the Union can compare with Missouri in variety of mineral resources, hence there is great need of an accurate geological survey. Much good work has been done on particular districts by Pumpelly, Winslow and others, to say nothing of recent studies of the lead and zinc deposits by geologists of the United States Survey, but the State itself has not pursued a steadfast policy; the public good has been sacrificed to political considerations, and the result has been intermittent activity and, once, at least, incompetent supervision. In fact, a volume published by the State Survey some four years or so ago was one of the most ridiculous mixtures of fancy and fact ever issued as a scientific work.

Under Dr. E. R. Buckley the work of completing a survey of the whole State is now proceeding systematically. When work began on the present report in November, 1901, there were 49 counties for which reports and maps had never been issued; 49 counties for which general reconnaissance reports had been published; one for which a complete detailed report had been published, and 20 parts of counties, for which detailed reports had been published. The present plan is, first, to complete reports upon the 49 counties for which no reports have been published; then to re-survey those counties of which reconnaissance reports alone have been issued. The county system of mapping is followed, as it gives a popular series of areal divisions.

Miller county is one of the most centrally located in the State. It is in the midst of the Ozark plateau, embodies a typical section of the Cambro-Silurian stratigraphy of Missouri, and hence is a desirable point from which to begin systematic stratigraphical work to cover the whole State. The surveying of outcrops has been done by the geologists, starting from and closing on known points, such as section corners, intermediate courses being taken by compass and the distances determined by pacing. This method should suffice, where the stratigraphy is as simple as that of the Ozark plateau. The results, as published, show an intelligent adaptation of means to end, and real ability for field work. It is to be hoped that further county reports will show such good common sense and freedom from pretentions.

The mineral resources of Miller county are varied, comprising barite, building stone, clay, silica, coal, iron ore, lime, lead and zinc, but the total value of the output, partly owing to insufficient transportation, is small.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Mining in Peru.

Sir.—Peru is a country of a small population, of between three and four million inhabitants, only a small percentage of whom are descendants of the Spanish. The language of the country is Spanish, but in many regions the Indians speak their native *quicha* idiom only. However, interpreters are seldom wanting; but the foreigner will find himself at a loss if he does not understand Spanish. These Indians are tractable and well-disposed, although lazy and not always honest. There is no danger in traveling in the interior, but those hardships must be endured which obtain in all new countries of Spanish America. The area of the country is enormous, as a glance at the map will show, and its diversity of climate, due to varying altitudes, gives place for the production of almost every known vegetable form; while its geology is such that all the known metals of commerce, with perhaps the exception of tin, exist in abundance and are mined. The greater part of the country is absolutely unexplored from an engineer's point of view, and the writer has visited regions where he was hailed as the "first engineer." The eastern slope of the enormous chain of the Andes—running northwest and southeast—is undoubtedly richer than the western slope, although there are many promising districts and some well-worked mines even near the Pacific coast. The vast auriferous regions of the interior are absolutely untouched; the silver and silver-lead mines of the central portion are those which have been principally exploited, and the copper deposits are beginning to be brought into notice. Tin does not so far appear to exist, although in Bolivia it is abundant. Quicksilver is an important mineral in the country, and has been produced in relatively large quantities in the past. In fact, the openings for capital are such as could scarcely be excelled, but without capital nothing can be done.

Of the principal branches of mining enterprise which offer themselves, one of the best is that to establish modern smelting furnaces for the treatment of silver and copper—as well as lead—and other ores. There are districts where these ores occur, not necessarily of high grade, but in abundance; and where there also exist great bodies of anthracite coal, which is of such a nature as can be used directly in the furnace as fuel. In several cases this is being done. Railways would be a paying investment in many districts; for example, comparatively short lines such as leaving the Pacific coast ports would cross the Cordillera, and tap the eastern slope. More ambitious projects would aim to unite the coast with the enormous navigable river system of the interior. There are subsidies, concessions and vast natural wealth awaiting those with capital and enterprise, who will carry out these works.

The writer has received a number of letters asking for advice as to the opportunities for American engineers here. This is always a difficult subject to advise upon. Each individual must "come, see and conquer" for himself. Briefly, the only advice that can be given is, "Learn Spanish and have sufficient resources at your back." It is not to be expected that there are many enterprises here which could, as yet, employ engineers from abroad.

Peru is a country of a great future; the foreigner is welcomed and respected, the laws are just, and the spirit of the nation and government generous in granting concessions which are both to the advancement of the concessionaires and the country. What is required in exchange is capital and work.

C. REGINALD ENOCK.

Huaraz, Peru, April 15, 1904.

CEMENT MANUFACTURE IN KANSAS.—The new plant of the Kansas Portland Cement Company, near Iola, Kan., was put in operation about March 1. Its capacity is approximately 1,200 bbl. per day. Its equipment comprises gyratory breakers, Griffin mills and rotary kilns. The plant is well designed and well constructed and should show a favorable manufacturing cost. The raw material is quarried close to the mill and the fuel is natural gas, supplied by wells near by. This is the second portland cement plant in Kansas, the other being that of the Iola Portland Cement Company, also at Iola, which has been a very successful venture, as is well known.

ABSTRACTS OF OFFICIAL REPORTS.

Isle Royale Copper Company.

This company operates a mine in the copper district of Lake Superior. Its report covers the year 1903.

The financial statement shows the following results; the product of refined copper being 3,134,601 pounds:

	Amount.	Per lb. copper.
Copper sold	$411,314	13.12
Interest, etc	33,281	1.06
Total	$444,595	14.18
Mine expenses	$307,437	9.81
Smelting, freight, etc	56,618	1.81
Exploration	7,259	0.23
Total	$371,314	11.85
Net earnings	$73,281	2.33

Adding a balance of $427,255 brought forward from 1902, gives a total surplus of $500,536 forward to current year.

A comparative statement of operations is as follows:

	1902.	1903.	Changes.
Rock stamped, tons	263,672	199,493	D. 64,179
Mineral saved, lb.	5,219,305	4,408,615	D. 810,690
Refined copper, lb.	3,569,748	3,134,601	D. 435,147
Fine copper in mineral, %	68.37	71.10	I. 2.73
Fine copper per ton of rock, lb.	13.50	15.70	I. 2.20
Fine copper per ton of rock, %	0.675	0.785	I. 0.110
Cost of mining per ton.	$1.2556	$1.2516	D. $0.0040
Cost of stamping per ton	0.2644	0.2884	I. 0.0240
Total cost	$1.5200	$1.5400	I. $0.0200

The increase in average cost of stamping was mainly due to the smaller quantity of rock treated.

The superintendent's report says that openings were 813 ft. on Portage lode, and 1,814 ft. on Isle Royale lode; a total of 2,627 ft. The report says: "All operations were brought to an abrupt termination, however, by a fire which occurred in No. 1 shaft on December 18, and which, in the rapidity with which it spread to all parts of the shaft where it could find timber to consume, has probably never been equalled by any mine fire in the history of the district. The result of this disaster was the complete destruction of all the timber that had been used in the shaft from the 16th level to surface, and included also the skip-road, pipes, pumps, etc., leaving nothing but the bare hole in the rock to represent what had previously been a model shaft. This occurrence necessitated the closing of No. 2 shaft for several days, owing to the danger to life due to the presence of quantities of gas that has made its way into the drifts and stopes. As soon as possible No. 2 shaft was again put into commission, and for the remainder of the year the mill was again reduced to a one-head basis, which will necessarily be the scale of operations, unless No. 1 shaft is re-timbered. This work would require several months, under favorable conditions, so that the coming year's operations will be on a small scale."

The directors' report says: "The result of operations for the year has shown that the grade of rock has not increased sufficiently to enable the company to make very large net earnings. It had been hoped that with the openings tributary to No. 1 shaft showing some improvement during the latter part of the year, much better results would be obtained during the coming year. Unfortunately, however, in the latter part of December the shaft was destroyed by fire, and we are at present simply mining enough rock from No. 2 shaft to keep one head busy at the mill. It has not yet been decided whether No.1 shaft will be re-timbered at present or not. Explorations with the diamond drill disclosed a copper-bearing lode in the southern part of the property, which appeared to be an extension of the Isle Royale lode. It is the intention, as early as possible in the spring, to locate this lode on the surface and do some work upon it, and on the result of this exploration will depend very largely whether we will at once re-timber No. 1 shaft or decide to spend the money in opening at the new exploration."

Pennsylvania Steel Company.

This company owns the Pennsylvania steel works at Steelton, Pa.; the Maryland works at Sparrow's Point, near Baltimore, and interests in various mining and other subsidiary companies. The report for the year 1903 shows that the various works turned out 715,000 tons pig iron and 837,000 tons steel. The income account was as follows:

Net earnings of works	$3,380,434
Income from investments	329,607
Total net income	$3,710,041
Interest paid	$1,008,630
Depreciation	512,313
Total charges	$1,520,943
Net profit for the year	$2,189,098

From this profit the sum of $1,419,360 was turned over to the holding company, as dividends on the stocks of subsidiary corporations; the balance of $769,738 being credited to profit and loss.

The report says, in substance, that at the beginning of 1903 the company owned a half interest in the Juragua Iron Company, Ltd. On November 1, 1903, the term of the limited partnership having expired and a renewal of the same not appearing desirable, the Juragua company was liquidated, so that this company is now interested in only one mining operation in Cuba, namely, the Spanish-American Iron Company. The two properties produced during the year 1903, 555,524 tons of iron ore, a decrease of about 20,000 tons from the previous year.

During the first three months the inability of the railroad companies to transport the necessary supplies rendered the operation of the steel works to full capacity an impossibility. For five or six months in the middle of the year the plants were run at a very satisfactory rate, while during the latter part of the year, owing to the sudden falling off in the demand for steel products, the output was again curtailed. The plants produced 715,000 tons of pig iron and 837,000 tons of steel, against 625,000 tons of pig iron and 802,000 tons of steel in 1902.

At the Steelton works the new bridge shop was a large producer and among other pieces of work completed the Williamsburg suspension bridge, between the cities of New York and Brooklyn, the largest structure of its kind in the world. At its Lebanon works the company began the construction of a by-product coke plant, which at the end of the year was somewhat more than one-half completed.

The Maryland Steel Company completed and put in operation 200 by-product coke ovens, which are now producing about 1,000 tons of coke per day. The marine department of that company completed two 12,000-ton freight steamers and several smaller vessels, and secured an order from the Government for a large floating dry-dock to be used at the Cavite naval station in the Philippine Islands.

The amount ($512,313) charged to general depreciation is believed to be conservative and liberal; in addition to this amount there have been spent and charged to cost of manufacture $507,920 for permanent improvements or as special depreciation of particular departments. The amounts charged to general and special depreciation are in addition to the sums spent upon the plants for ordinary repairs and maintenance.

During the year the subsidiary companies have made expenditures for additions and improvements and charged the same to capital account, as follows: The Pennsylvania Steel Company, $792,516, principally for completing new shops and for by-product coke ovens at Lebanon; the Maryland Steel Company, $623,362, principally for the completion of by-product coke ovens; the Spanish-American Iron Company, $112,313, for completing railroad and opening new mines; a total of $1,528,191 charged to capital account.

The only important improvement at present in contemplation at the works of either of the subsidiary companies is the completion of the by-product coke oven plant at Lebanon.

Rand Mines, Ltd.

This great consolidation of shareholdings in a group of South African companies represents the largest ownership of gold mines in existence. The total number of claims held is 2,054, the number of stamps erected is 1,180, while the nominal share value is £490,000, and the market valuation at the present time, when it is lower than it has been, is £21,192,500, or $105,962,500.

At the recent annual meeting held at Johannesburg, the chairman, among other matters, gave the following information: During the past year our nine subsidiary milling companies crushed 1,543,542 tons of ore, producing 628,748 fine oz., equal to 8,146 fine dwts. per ton, of a total value of £2,642,701, equal to 34s. 2.904d. per ton milled. Working costs aggregated £1,685,826, equal to 21s. 10.123d. per ton milled, and the working profit amounted to £956,874, or 12s. 4.781d. per ton milled. The gold produced represents practically 22 per cent of the total output of the Witwatersrand gold-fields for the past year, whereas our total number of stamps erected is only 16.5 per cent of the total number on the fields. With regard to the working costs of 21s. 10.123d. per ton milled, I would point out that this figure, which is the average cost of treating over 1,500,000 tons by nine different companies, extending from the Glen Deep on the east, to the Durban Roodepoort Deep on the west, is a very valuable figure of average cost of deep level mining under the conditions prevailing on these fields during the past year. It is made up as follows:

Mining expenses	13s. 9.060d.
Milling	2s. 10.299d.
Cyaniding	2s. 11.575d.
General expenses	2s. 3.189d.
Total	£1 1s. 10.123d.

The actual cost of mining, which includes delivery of the ore to the sorting and crushing stations, worked out per ton mined, is as follows: General costs, including general mine maintenance, 10.124d.; developing, 1s. 4.514d.; stoping, 6s. 2.563d.; shovelling in stopes, 1s. 10.142d.; tramming, 1s. 1.789d.; winding, 1s. 2.299d.; pumping, 5.778d.; total, 13s. 1.209d.

The difference shown in mining expenses when calculating on the number of tons mined and milled is due to the cost per ton mined being calculated over the whole quantity of

rock brought to the surface, whereas the milled tonnage is calculated after allowance has been made for the waste rock discarded from the total tonnage hoisted, plus any additions thereto from the surface dumps, allowance being made for any small difference in the mill bins. Both figures given as mining expenses include the cost of development, which for the year is equal to 1s. 5.889d. per ton of ore developed. The details of the cost per ton of milling, including the delivery of the ore from the sorting and crusher station to the mill, are as follows: General costs, 0.823d.; ore sorting, 1.736d.; ore crushing, 4.419d.; ore transport, 1.212d.; milling, 2s. 1.409d.; retorting, smelting and assaying, 0.700d.; total, 2s. 10.299d. As regards the item of 2s. 11.575d. for cyaniding expenses, the average cost per ton treated was: For concentrates, 5s. 3.522d.; for sands, 2s. 10.252d.; for slimes, 2s. 7.832d.; and the average cost per ton treated, 2s. 11.975d. The exceedingly small difference shown between the average cost per ton treated and the average cost per ton milled is due to the fact that almost 99 per cent of the pulp leaving the mill passed through the different stages of the cyanide works. The general expenses are accounted for through expenses, at the mine, 1s. 5.414d., and at the head office, 9.775d. per ton.

Exclusive of the cost of development the actual expenses on the milled tonnage basis, for mining, milling and cyaniding, work out at 18s. 1.596d. Of this, 12s. 3.722d. is spent in the work from the breaking of the rock in the stopes, hoisting it to the surface, and delivery to the mills, and only 5s. 9.874d. represents the cost of crushing, sorting, milling and cyaniding. The average percentage of rock discarded as waste was only 7.153 per cent, as against 23.852 per cent for the first nine months of 1899. It is, however, evident from the figures given that any saving in working costs will in future have to be made more through savings underground than on the surface. In the nine full working months of 1899 the total tonnage milled amounted to 1,296,125 tons, the average assay value to 11.543 dwt., and the extraction was 87.819 per cent. For last year 1,543,542 tons were milled, the average assay value was 9.247 dwt., and the average recovery came to no less than 88.106 per cent, the best extraction being 94.120 per cent, at the Ferreira Deep. The percentages quoted represent in all cases the actual extractions obtained. No allowance has been made in the costs for the 10 per cent profits tax, which amounted to £77,670 for last year, or equal to just over 1s. per ton milled.

With regard to treatment, the ore received from the mines amounted to 1,620,626 tons; 42,874 tons were taken from surface dumps, making a total of 1,663,500 tons; 7.153 per cent of this amount, equal to 118,988 tons, were sorted out as waste, leaving 1,544,512 tons to be sent to the mills. The assay value per ton of waste sorted out was 0.993 fine dwt. The average number of stamps in operation was 880, running 348,344 days. The ore received from the sorting station amounted to 1,544,512 tons, from which have to be deducted 970 tons, being difference in mill bins, thus showing that a total of 1,543,542 were crushed, the duty per stamp per 24 hours being 5.035 tons. As regards the values, we find that the ore before crushing, as determined by mill yield, plus assay value of pulp leaving mill, was equal to 9.247 fine dwt. The mill yield per ton was 4.974 fine dwt., and the assay value of pulp leaving the mill amounted to 4.273 fine dwt. Concerning the treatment in the cyanide works, 98.889 per cent of the pulp leaving the mills, equal to 1,526,397 tons, were classified into concentrates, sands, and slimes. The assay value was 4.259 dwt., and the yield was equal to 3.208 fine dwt. The assay value of the residues was .794 fine dwt. The actual extraction obtained was 75.338 per cent, while the theoretical extraction showed 81.352 per cent. The results of ore treatment on the basis of the tonnage milled for the year, summarized, are as follows:

	Yield. Fine dwt. Per ton.	Actual extraction. Per cent.
Mill	4.974	53.972
Cyanide works	3.173	34.134
Total	8.147	88.106

The capital expenditure for the year totalled £109,131, of which £7,732 4s. 3d. was expended for shaft sinking, £33,649 for machinery and plant, £67,455 on buildings, and £293 on tree-planting and fencing.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Asbestos.—We send you two samples of asbestos and would like to know the grade of each and its value; also please inform us as to purchasers of the mineral.—T. H.

Answer.—The samples you send can hardly be called asbestos, as they show little of the fibrous character of that mineral. They are probably more closely related to talc, although they contain such a large proportion of impurities as to render them unsuitable for the purposes for which talc is used. Such material would have no value in the market. The prices for asbestos vary according to quality. Long fibers, free from discoloration, sell for $200 per ton and even more, while the poorer grades, which are ground and used as paper filler, bring $15 or $20 a ton. The H. W. Johns-Manville Company, 100 William street, New York, is a large consumer of asbestos.

Copper in South Africa.—Can you give me any information about the principal producing copper mines of South Africa? I would like to know the quantity produced, nature of ores, system of treatment, and such other information as is attainable. Where can I obtain a recent mining map of the copper districts?—C. B.

Answer.—Your questions are rather too comprehensive for full answer in this column. Briefly, there are, at present, only two copper producing companies in South Africa, the Cape Copper Company and the Namaqua Copper Company. Both are in the same district, in the northeastern portion of Cape Colony. The Cape Copper Company owns several mines, the ores from which are carefully sorted and selected. They are pyrite and chalcopyrite, the former running about 6 per cent, and the latter from 15 to 18 per cent copper. These ores are smelted at the company's works at Ookiep, and the resulting matte is shipped to works at Britonferry, in England, which are controlled by the company. The Namaqua Company concentrates its ores, which are of similar character, as far as possible, and ships concentrates to Swansea.

The South African production, reduced to fine copper, has been, for a series of years: 1898, 7,060 long tons; 1899, 6,490 tons; 1900, 6,720 tons; 1901, 6,400 tons; 1902, 4,450 tons; 1903, about 5,100 tons. The mines were badly damaged by the Boers during the late war, and the injuries were repaired very slowly.

Copper deposits, said to be of great extent and value, have been found in the northern part of Rhodesia. They have not been sufficiently explored, as yet, to determine their true value, and are still far from the producing stage.

We do not know any good mining or geological map, which includes the copper district of Cape Colony. You might obtain some maps by corresponding with the Cape Copper Company, which has its office at 9 Queen Street Place, London, E. C., England.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON BARYTES.—Barytes separated from the mass in which it is found in the mine by a process of crushing and jigging is dutiable upon importation at 75c. per ton under the provision in paragraph 44, act of 1897, for baryta, sulphate of, or barytes, unmanufactured, and not at $5.25 per ton, the rate provided in said paragraph for manufactured sulphate of baryta, or barytes.—Circular of Treasury Department, April 28, 1904.

EXCEPTION AS TO MINERALS EMBRACES "ROCK" UNDER SURFACE OF LAND.—The owner in possession of lands covered with limestone ledges rising above the natural surface of the ground, having some timber on same, but the chief value of which was manifestly the stone, conveyed the same warranty deed, excepting and reserving from the grant "all mines and minerals that may be found on the above piece of land, with the right of entering at any time," to dig and carry away the same. It was held that the exception comprehended the rock under the term minerals, although such construction practically destroyed the grant.—Brady v. Brady (84 *New York Supplemental Reporter*, 1119); Supreme Court of New York.

EXTRA-LATERAL RIGHTS—EXPLORING FOR VEIN.—In this case the defendant, owning the apex of a vein, started a tunnel from its workings, intended to run under the property of plaintiff, expecting to strike the continuation of the vein in that claim. Plaintiff applied for an injunction, which was granted by the lower court. On appeal it is held that the injunction was properly granted. While defendant could, under its extra-lateral rights, follow the vein having an apex on its ground, into the plaintiff's territory, this did not confer the right to explore for the vein by adit, or tunnel. Generally speaking, the extra-lateral rights can only be exercised by actually following the vein in its course directly, and general exploration work for its prolongation is not permissible.—Montana Mining Company, Ltd., v. St. Louis Mining & Milling Company; Supreme Court of the United States.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending May 10, 1904.

759,171. HOT-BLAST APPARATUS FOR METALLURGICAL FURNACES.—Ambrose P. Gaines, Bessemer, Ala. In a hot-blast apparatus for metallurgical furnaces, the combination with a furnace, a regenerative stove or chamber, means for supplying a blast of air thereto, and a closable connection between said stove and furnace through which the hot blast passes to the furnace, of a plurality of combustion-chambers separate from the stove, a closable connection between each combustion-chamber and stove through which hot gases and products of combustion pass from the chamber to the stove, and means for supplying gases for combustion in said combustion-chambers.

759,224. BUCKET.—Robert J. Aspin and John A. Erickson, Lorain, Ohio. In a conveyor bucket, the combination with a rigid-frame, of tongs pivoted to said rigid frame, arms or bars pivoted at their inner ends to the rigid frame, and scoops or trays pivotally secured at their inner ends to the tongs and at their outer ends to the arms or bars.

759,295. CONVEYING APPARATUS.—Thomas S. Miller, South Orange, N. J. In a ropeway, in combination, a traction-rope containing an outward and an inward run, means for actuating the same in opposite directions, a movable guide in a loop of the same, a tension device controlling the position of said guide and a load-carriage engaging both the outward and inward runs of said traction-rope.

759,326. ROLLING-MILL. — James D. Swindell, Pittsburg, Pa., assignor to American Furnace & Machine Co., Pittsburg Pa. The combination of two presser-rolls, a flexible guide device disposed at one side of and normally bearing against one of said rolls to direct material over the same, and adjustable yielding means connected with the free end of said flexible device for holding the same against the rolls.

759,356. METHOD OF BURNING PORTLAND CEMENT CLINKERS, ETC.—Thomas A. Edison, Llewellyn Park, N. J. A method of burning clinker or analogous material, which consists in forcing, by compressed air, a plurality of streams of pulverized fuel within the burning-chamber, in establishing combustion of such material, whereby a plurality of combustion zones will be secured, in subjecting the material successively to the heating effect of such zones, and in regulating the air-pressure so as to cause the combustion zones to overlap.

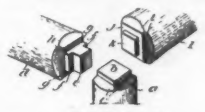
759,357. APPARATUS FOR BURNING PORTLAND CEMENT CLINKER, ETC.—Thomas A. Edison, Llewellyn Park, N. J. In apparatus for burning Portland cement clinker and other materials, the combination with a rotary-cylinder burner to which the material is supplied and through which it is caused to travel, with means for producing within said burner a series of combustion zones, lengthwise of the cylinder.

759,358. MAGNETIC SEPARATING APPARATUS. —Thomas A. Edison, Llewellyn Park, N. J. An improved magnetic separator, comprising two tapering magnetic poles sustained adjacent to each other with a narrow gap between them and with the upper pole slightly overlapping the lower, in combination with means for feeding pulverized magnetic and non-magnetic particles directly to the upper surface of the upper pole near its edge, whereby the magnetic particles will by the lines of force be deflected toward and fall below the under surface of the lower pole without passing through said gap, and a dividing-board below the lower pole for separating the magnetic and non-magnetic particles.

759,406. PROCESS OF PRODUCING GAS-CONDENSING BODIES. — Albert Tissier, Paris, France. A mode of manufacturing a gas-condensing body for use as described, which consists in reducing to a powder a natural quartz mineral composed approximately of 78.80 per cent of silica, 1.44 of iron oxide, 6.96 of alumina and 4.32 of magnesia, then adding water to the mass, shaping the mixture into bodies of desired form and then subjecting the said bodies to a temperature of about 2,000° C. whereby to bind the particles and develop the porosity of the bodies.

759,412. MEANS FOR SINKING OIL-WELL CASINGS.—Eben J. Beane, San Francisco, Cal. Mechanism for sinking well-casings, comprising an endless pressure-cable, anchored sheaves located at opposite sides of the well and through which the endless pressure-cable works, one bight of the said cable passing over the top of the casing-section to be forced downward, and hoisting means connected to the opposite bight of the said cable, so that an upward strain exerted thereon imparts to the first-named bight of the pressure-cable a downward strain.

759,418. MINE TIMBER.—David W. Brunton, Denver, Colo. Round mine-timbers, having rectangular



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tenons projecting from flat bases at the end of the said timbers, the sides of the timbers next the bases being beveled.

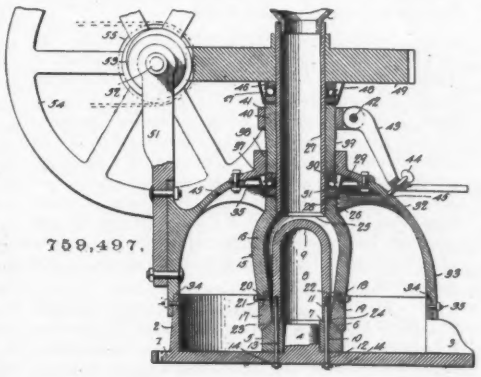
759,422. MACHINE FOR SAWING STONE.—George H. Davis, Proctor, Vt. A stone-sawing machine, having a saw-frame, hangers therefor, sway-bars, and yielding connections for the hangers and sway-bars arranged upon opposite sides of the sway-bars.

759,443. BINDER FOR BRIQUETTES.—Edward J. Hoffman, Chicago, Ill., assignor to National Compressed Coal Company, Wilmington, Del. A binding compound for fuel briquettes, consisting of crude petroleum, rosin, soda-ash and lime.

759,449. LEAK-DETECTOR FOR TUYERES, COOLING-BOXES, ETC.—Andrew C. Kloman, Pittsburg, Pa. A cooling device having a passage therein for a cooling fluid, and an inlet and an outlet therefor, a rotary device in said passage constructed to rotate when the inflow is greater than the outflow, and means whereby the rotation of the rotary device may be indicated.

759,493. METHOD OF RECOVERING METALS FROM SOLUTIONS.—Isaac Anderson, Prescott, Ariz., assignor of one-half to Michael Scanlan, Whitehills, Ariz. A method of recovering precious metals from solutions, consisting in treating the solution with lime in the presence of baser metals.

759,497. QUARTZ-MILL.—Edward Booker, San Diego, Cal.—In a quartz-mill, a base having an upwardly tapering centering-plug, an annulus engaging said plug and having a beveled portion at its



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outer upper edge, a cylindrical member supported upon the flat upper edge of the annulus and having screw-threaded bores, screw-threaded rods extending through the base and the annulus into said bores, and nuts upon the lower threaded ends of said rods.

759,526. WELDING-FLUX.—William W. Hout, Cortland, N. Y. A welding flux or compound consisting of calcined borax, iron or steel filings, drillings or cuttings, furnace dross, slag or cinder, and calcined marble-dust.

759,528. PROCESS OF COATING METAL OBJECTS.—Allen Johnston, Ottumwa, Iowa. A process of finishing and coloring metal objects, which process consists in placing in a rattler the objects to be coated together with a binding liquid, then distributing the liquid by rattling and at the same time abrading a portion of the metal from the objects being coated, thereby coating the objects with a mixture of liquid and material abraded from said objects.

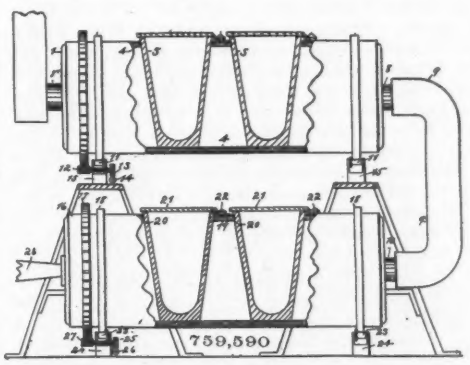
759,557. CONVEYOR OR CATCHER FOR ROLLING-MILLS.—Charles Scholtz, Sharon, Pa., assignor to the Sharon Steel Hoop Company, Sharon, Pa. A conveyor or catcher for rolling-mills and the like, comprising a plurality of rollers, and an independent driving-motor connected directly to the axle of each roller.

759,568. CASTING APPARATUS.—George Stroh, Syracuse, N. Y. The combination with the melting-pot provided with a discharge-port at its top, of a duct tapping the bottom of the melting-pot and extended descendingly therefrom, a pressure-chamber communicating with the lower end of said duct, and a plunger in said chamber.

759,569. CASTING APPARATUS.—George Stroh, Syracuse, N. Y. A device comprising a combustion-chamber, with a pressure-chamber and a melting-pot integrally formed therewith located in said combustion-chamber, with a communication between the pot and pressure-chamber, a shield extending partially the length of the pressure-chamber, and surrounding the sides and bottom thereof and being extended outwardly and in communication with the atmosphere, a plunger in said pressure-chamber inclosed by said shield, and a nozzle at the upper end of the pressure-chamber.

759,574. PUMPING-POWER.—Edgar O. Weidler, Oil City, Pa., assignor to the Oil Well Supply Company, Pittsburg, Pa. In a pumping power, the combination with a bed-plate having a split socket for the reception of an arbor, of a stub-arbor clamped in the split socket of the bed-plate, a power-gear journaled on the stub-arbor, and a power-shaft journaled on the bed-plate for actuating the power-gear.

759,590. PROCESS OF PRODUCING IRON OR STEEL DIRECT FROM ORE.—Walter M. Brown and Dexter Reynolds, Albany, N. Y. A process of producing iron and steel direct from the ore consisting of mixing granulated oxide-of-iron ore with granulated carbonaceous material in quantity and



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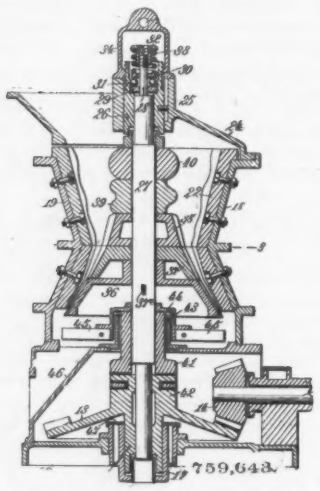
quality sufficient to deoxidize the ore and carbonize the iron to the grade of iron or steel desired; heating the mixture by the heat only of waste products of combustion and stirring and intermixing the mixture while being thus heated, and protecting it from contact with said products of combustion, except the heat, and from contact with the atmosphere until the iron is deoxidized and suitably carbonized, after deoxidation and carbonization has taken place, introducing into the mixture flux sufficient in quantity and quality to remove impurities; heating the mixture by means of the heat from an initial source of heat and at the same time protecting the mixture from contact with the rest of the products of combustion and from the atmosphere, until melting or fusion of the iron results, the waste products used being from the initial source of heat.

759,617. ALLOY.—Stephen Kneppel, Scranton, Pa. An alloy comprising substantially six parts aluminum, one part zinc and two parts babbitt metal, by weight, the babbitt metal consisting substantially of 96 parts tin, eight parts antimony and four parts copper, by weight.

759,635. WELDING APPARATUS.—Thomas F. Rowland, New York, N. Y. In welding apparatus, two tracks, means upon each of said tracks to support an article to be welded, a movable anvil to operate within each of said articles, a hammer, means to actuate said hammer and means to movably support said hammer so that it may coact with either anvil.

759,643. CRUSHING AND GRINDING MILL.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, Portland, Me., and Boston,

Mass. In a vertical crushing-machine, the combination with a vertical shaft having a portion which is of polygonal shape in cross-section and which shaft is provided at its upper end with a hoisting-head, of rotating crushing elements loosely



strung on the said polygonal portion of said shaft, an upper bearing from which said shaft is supported, a mill-casing formed in two parts, one of which is vertically hinged to the other so that it may be swung aside horizontally when access to the crushing member of the mill is desired, and a removable key which supports the lowermost of said rotating crushing elements: whereby, when the said key is removed, the said shaft may be hoisted out of the mill leaving the said rotating crushing elements free to be removed horizontally from the chamber of the mill when the said hinged portion or door of said casing is swung aside or opened.

759,644. TURNING APPARATUS FOR ROLL-TIRES.—Thomas L. Sturtevant, Quincy, Mass., and Thomas J. Sturtevant, Wellesley, Mass., assignors to Sturtevant Mill Company, Portland, Me., and Boston, Mass. In a turning or machining attachment for crushing rolls, the combination with a turning-tool device and a driving-shaft of a swinging arm or frame, a counter-shaft carried by said swinging arm or frame, driving connections between said power-shaft and said counter-shaft, and means on said counter-shaft for driving the crushing-roll to be turned or machined.

759,659. STUFFING-BOX FOR GAS-COMPRESSOR.—George Braungart, Jr., Chicago, Ill. The combination of a gas-compressing cylinder having a piston-rod extending through one end of same; a stuffing-box surrounding said piston-rod; a chamber in said stuffing-box, extending around said piston-rod and adapted to receive gaseous leakage from said cylinder; a second chamber in said stuffing-box, extending around said piston-rod, at the side of said first chamber which is away from the gas-compressing cylinder, and adapted to contain a liquid under pressure; and means operated by the pressure of the gas in said first chamber and adapted to exert on the liquid in said second chamber a pressure greater than that of the gas in said first chamber.

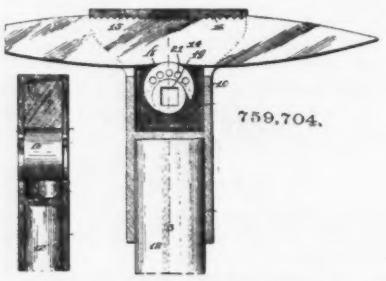
759,670. REDUCTION OF COPPER ORES.—Ernest P. Clark, New York, N. Y., assignor of one-half to Edward Baltzley, Glen Echo, Mo. A process for working mixed ores of copper, consisting in first leaching the ore raw to extract the soluble contents, then concentrating the insoluble portion of the copper contents, and rendering this portion soluble by oxidizing it and then leaching the same.

759,690. DREDGE ATTACHMENT.—Herman A. Funke, Elizabethtown, N. Mex. The combination with a series of buckets running with an endless chain, of a scraper comprising a plurality of scrapers proper connected to revolve in unison and juxtaposed to the buckets so that the said scrapers proper are successively engaged by the buckets, said scrapers being rotated by the contact of the buckets therewith.

759,706. AIR OR GAS LIFT FOR FLUIDS.—Walter B. Harris, Indianapolis, Ind. An air or gas lift for fluids including an air-tight casing, a single delivery-pipe within the casing, ejectors connected with and arranged in said pipe at intervals, a separate pipe leading to each ejector through which compressed air or gas may be introduced, and means for introducing compressed air or gas into said casing to press downward upon the body of fluid therein.

759,730. ROTARY-RABBLED ORE-ROASTING FURNACE.—Thomas D. Merton, Spottiswoode, near Melbourne, Victoria, Australia. In a roasting-furnace, the combination of a hollow rotatable spindle, gas-supplying mechanism communicating with one end thereof, a laterally-orificed boss mounted on said spindle, a rabble-arm inserted in one of the orifices, a perforated air-distributing pipe inserted in one of the other orifices and communicating with the hollow spindle, said rabble-arm projecting laterally transversely through the air-supplying pipe and forming a partition to divert the air into the air-distributing pipe.

759,704. MINER'S PICK.—Martin Hardsocg, Ottumwa, Iowa. An eyeless miner's pick, comprising the



stem formed with a recess, a pick-blade mounted in the recess, and an eccentrically-mounted lock wholly in the recess and arranged for rotation into engagement with the pick-blade at times.

759,750. APPARATUS FOR THE INTRODUCTION OF PULVERULENT SUBSTANCES INTO CONVERTERS, ETC.—Gustav Rosenthal, Letmathe, Germany. In a device for introducing pulverulent substances into converters, blast-furnaces, the combination with the blast-conduit, of two pipes, abutting into the same, more or less vertically and in opposite directions opposed to and in the direction of the blast-current, the receptacle arranged above the pipe containing the pulverulent substances, communicating with each other and thereby adapted to, on the blasting-current passing through the blasting-conduit, produce a pressure in one of the pipes and a corresponding vacuum in the other, under the influence of which a quantity of the pulverulent substance, proportional to the velocity of the blasting-current, is sucked off from the receptacle and carried by the blasting-gases to the metallurgic apparatus.

759,763. STEAM DIRT-EXCAVATOR.—Benjamin R. Snider, Abingdon, Iowa. The combination with an excavator, of a beam secured thereto, a pivotally-supported bell-crank, one arm of the bell-crank connected with the beam and means secured to the remaining arm of the bell-crank for raising and lowering the beam and excavator.

759,764. EXCAVATING-MACHINE.—Dillon H. Snyder, East Toledo, Ohio, assignor of one-half to Paul I. Sawyer, Findlay, Ohio. In an excavating-machine, the combination with a suitable supporting-base, of a superimposed structure rotatably mounted on said base, forwardly-inclined booms supported by said structure, a scoop or shovel having a rigid upwardly-projecting arm, operating-levers pivotally connected to said scoop at their lower ends, a cross-head slidingly mounted in the upper portion of said structure and pivotally connected to the upper ends of said operating-levers and means for operating said levers and scoop.

759,768. TUYERE ATTACHMENT FOR BLACKSMITHS' FORGES.—Edward E. Taber, Pratt, Kan. In a tuyere attachment for fire-pots, the combination with an open-ended cylinder having a series of transversely-disposed outlets in one side and an oppositely-disposed inlet at the other side and disposed midway the ends of the cylinder of gates and cut-offs, operated by a rod.

759,775. APPARATUS FOR SEPARATING METALS FROM THEIR CRUSHED ORES OR MATERIALS CONTAINING SAME.—William N. Turner, Ipswich, England. In an ore-separating apparatus, the combination with the separating-tables, of a receiving vessel, division-plates therein, and means for distributing the matter under treatment to the several tables, consisting of a series of channels, a vertically-adjustable gate at one end of each channel, and a series of sets of adjustable baffles, one set for each table, said sets progressively increasing in size from the set nearest the receiving vessel.

759,783. SMOKELESS FUEL.—Thomas Weeple, Oakland, N. J. A method of producing smokeless fuel, which consists of boiling soft coal in water, whereby the mass becomes dehiscent and deleterious volatile matters are eliminated.

759,789. CHIMNEY-COWL.—Beaumont S. Whitton, Louisville, Ky. An improvement in metallurgical furnaces, comprising a body or main section having a hearth provided at one end with a fire-box and adjacent thereto with an inclined surface and at its opposite end with steps and with a pre-heater projecting above the steps and provided with the opposite inwardly-projecting staggered projections and having charging openings or doors arranged above the steps and the several inwardly-extending projections, an oil-burner discharging to the fire-box, oil-burners discharging into the body or main section, and oil-burners discharging to the steps and to the several inwardly-extending staggered projections of the preheater.

759,798. ELECTROLYTIC APPARATUS.—Henry S. Blackmore, Mount Vernon, N. Y. An electrolytic apparatus comprising an electrolytic cell having an anode, a liquid-metal cathode, an outlet near the upper surface of the cathode and a body of electrolyte supported by the cathode, and a feed device for supplying additional liquid metal to the cathode as the alloy produced by electrolysis flows off through said outlet, means whereby the feed device controlled by variations in the density of the cathode.

759,799. ELECTROLYTIC APPARATUS.—Henry S. Blackmore, Mount Vernon, N. Y. An apparatus for electrolyzing light-metal compounds comprising a containing vessel, a partition including a diaphragm, dividing the vessel into two compartments, an anode in one compartment, a molten-metal cathode in the other compartment and in contact with the diaphragm, the upper surface of the cathode being above its surface of contact with the diaphragm, means for removing the light metal from the alloy or amalgam produced by electrolysis as it rises to the upper surface of the cathode, while the depleted portions of the cathode return into contact with the diaphragm, thereby effecting an automatic circulation of the cathode between the points where it receives and gives up the light metal, and means for maintaining the electrolyte in a molten condition.

759,802. QUARTZ-MILL.—Edward Booker, San Diego, Cal., assignor to the California Quartz Mill Company, San Diego, Cal. In a quartz-mill, the combination with a stationary pestle of uniform diameter throughout its length and provided with an inclined shoulder near its lower end, of a rotary mortar housing the pestle, having its lower end disposed to coact with the inclined shoulder of the same, and a feed-throat extending upwardly from said mortar and attached thereto.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending April 23, 1904.

6,552 of 1903. DEEP BORING APPARATUS.—A. Dettmer, Genck, Belgium. Improvements in the inventor's deep boring apparatus, chiefly with the object of altering the stroke of the boring rod.

6,757 of 1903. MINE CAR LUBRICATOR.—J. Thornley, Manchester. Improved lubricators for the axles of colliery wagons.

11,297 of 1903. BLAST FURNACE WATER JACKET.—O. S. Garretson, Buffalo, N. Y., U. S. A. Improvements in the water jackets for blast furnaces, chiefly to improve the circulation of the water.

11,303 of 1903. MATTE SMELTING.—O. S. Garretson, Buffalo, N. Y., U. S. A. In matte smelting, where molten matte is bessemerized underneath the smelting charge, methods of recovering the metals which go away in the slag.

11,565 of 1903. DRILL POINT.—W. Timmins and J. Engelerest, Dudley. Improved form of point for twist drills used in drilling in coal or rock.

12,778 of 1903. PLACER MINING MACHINE.—W. N. Turner, Ipswich. Improved method of separating gold from alluvium, the object being to divide the alluvium into several different sizes.

3,849 of 1904. MINE CAR COUPLING.—T. C. Morgan, Aberdare. Improved means of preventing shackle-pins of colliery wagons coming out.

SPECIAL CORRESPONDENCE.

Butte. May 12.

(From Our Special Correspondent.)

The Butte ore market is strong for ores, with a high silicious gangue, low in sulphur. Ores carrying 75% and above of silica, with a moderate assay value in gold and silver, are sought by the copper reduction plants, to be used in the mixture for converter linings. When such ores are found suitable for the purpose mentioned, a very low treatment charge is made to the shipper by the smelters. The reduction works take about 75% silica content, to base the treatment charge on; if the silica runs above the basic unit, 15c. per unit is allowed for each unit of excess; if the silica is below the basic unit of calculation, a charge of 15c. for each minus unit is added to the treatment cost to the shipper. In all cases the iron present must be practically nothing. The basic charge for treatment of these ores is about $4 per ton, f. o. b. smelter. These terms will allow a number of low-grade silicious mines to be worked at a profit, which heretofore have not been paying.

The report of the United States assay office, at Helena, for the month of April, shows that the receipts of gold and silver from Montana alone during the month amounted to $191,332, as against $172,365 for the same month last year, a difference of $18,967. An increase in the production of gold in almost every mining county in Montana is shown by the report. That of Madison county is phenomenal. This year a total of $47,383 in gold was received from that county, as against $13,585 for April a year ago. This is an increase of more than 250%. Fergus county still leads in gold production in the State. Last month $111,589 in gold was received from that county at the assay office, compared to $109,026 received during April last year.

The total gold receipts from the various counties in Montana for April, 1904, is: Beaverhead, $769; Broadwater, $939; Granite, $145; Lewis & Clarke, $10,811; Madison, $47,383; Powell, $346; Deer Lodge, $5,373; Fergus, $111,586; Jefferson, $4,446; Park, $8,485. The amounts of gold received from outside of Montana were: Idaho, $3,352; Nevada, $4,456; Washington, $379; British Columbia, $7,439; old gold and miscellaneous, $456.

During the years 1894-96, the Lump Gulch mining district, situated 10 miles south of Helena, in Jefferson county, was an active producer of silver ore. Six producing mines were in operation, with several other properties in the development stage, the majority of the latter promising to add to the list of regular shippers. The ore of the district is a complex silver blende, in an acid granite formation. With the low price of silver then prevailing, owing to its high silver contents, the ore was found profitable to mine and the camp was prosperous. This condition was followed by the formation of a local miners' union, which no one objected to so long as it attended to its own affairs and allowed the mine operators to do likewise; but troublesome times were in hand for the operators, which in August, 1896, culminated in a complete shut-down of every mine in the district by a strike. The mine-owners, without exception, looked upon the attitude of the miners' union as so obnoxious that it was decided to keep the mines closed indefinitely; so they have remained. The miners' union has been a thing of the past ever since. The foremost producer of the camp at the time was the Liverpool mine, which, during the time mentioned, produced something over $500,000, taken from above the 500-ft. level. This is the only one of the mines which has resumed. New machinery was placed on this property about 18 months ago, and the shaft has now reached the 750 level. The new ground opened between the bottom and the 500 level is producing better values than formerly. There is a movement on foot by the owners of most of the other old properties which will probably result in reopening these during the summer.

In 1892 and part of 1893, the Argonaut property, in Jefferson county, had produced about $30,000 in silver ore. When the slump took place in the price of the white metal in June, 1893, the mine was closed down by the owner and has remained closed ever since, owing to the radical views held by the owner regarding free coinage. Butte people have now secured the property, and will proceed to reopen it at once. The shaft is only 100 ft. deep, with 2 ft. of quartz and ore in the bottom. A drift run at 40 ft. has 6 in. of ore for its entire length of 200 ft. No stoping has been done below this level. Owing to the greatly reduced charge made by the smelters at present on this class of ore, it can be mined at a good margin of profit. The mine is 1.5 miles from the railroad at Alhambra. It is the purpose of the new management to continue the shaft by sinking to a depth of 250 ft. or more.

Denver. May 14.

(From Our Special Correspondent.)

A good deal of bitter feeling has been caused this week on the part of the attorneys and the business element of Telluride, on account of the action of Judge Theron Stevens, in adjourning the May term of the District Court of San Miguel county, and a protest has been filed by the attorneys, many of whom had come long distances with their witnesses and clients. In announcing his decision, Judge Stevens stated that, whereas the county is under martial law, such portions of the court's orders as would not meet the approval of the military, might not be executed, and that it would be a farce to attempt to enforce civil law in the county. Moyer still remains a military prisoner.

After a number of postponements, the trial of William D. Haywood, secretary-treasurer of the Western Federation of Miners, was held in Denver a few days ago and Judge Hynes took the matter under consideration. The charge is based on the sending broadcast of a circular, bearing the picture of a flag and headed, "Is Colorado in America?" The habeas corpus proceedings in the Moyer case were continued in the Supreme Court this week, and it is hoped that the opinion in this famous matter will be handed down within a couple of weeks.

In both the counties, which have been under martial law for some time, the military forces are being reduced. In Las Animas county only about 150 men are left, and at Telluride a guard of 18 men; although in the latter town it is understood that a force of several hundred could assist these within a few minutes, if necessary, a very thorough organization of the Citizen's Alliance existing. A thorough watch is kept that none of the deported agitators return.

The report of Judge Elston, appraiser of the Stratton estate, states that the value of the same at the time of Mr. Stratton's death was $6,207,166. Under the inheritance tax law of Colorado, the State will receive the sum of $362,844.

The work of removing the large pumps from the 1,400 ft. station in Stratton's Independence mine, was completed a few days ago, and below the 900-ft. levels no further work will be done, except on a small scale near the north end of the property, where some prospecting is continued.

A few weeks ago reference was made to the new mining legislation, concerning the corner monuments, which henceforth must be taken as determining the proper location. It is likely that there will very soon be a test of the question through a suit commenced in the United States District Court.

Clear Creek county, which is the pioneer lead-silver district of Colorado, shows a production much larger than was the case during the first four months of last year, caused principally by the erection of modern plants, where the low grade ores are put into concentrates, which can bear the expense of shipment to the Denver smelters.

The Denver, Northwestern & Pacific Railroad Co. has commenced the construction of its freight houses by breaking ground for their foundations on land adjoining a tract owned by the Burlington road. It is not known yet how the road will enter Denver, but the general opinion seems to be that it will be over the right of way of the Colorado & Eastern, which, rumor has it, has been purchased for that purpose.

The Colorado & Northwestern Railroad, operating in Boulder county, which was sold a few days ago under a mortgage to the Mercantile Trust Co., will at once be reorganized. The company is at present operating about 25 miles, but has made surveys of several branch lines, which it expects to construct and which will be a great help to the Jamestown and Eldora districts.

A number of officials of the American Smelting & Refining Co., of New York, are at present in the West, among them Messrs. Karl Eilers, Simon Guggenheim, Edgar Newhouse, S. W. Eccles and August Raht. The enlargement in capacity of the Murray plant near Salt Lake City is said to be under consideration.

Duluth. May 14.

(From Our Special Correspondent.)

At no point in the Lake Superior region is there more activity just now than at the Glen Monroe and Howard mines, of the Oliver Iron Mining Co., in the Hibbing district. The Glen is probably the best opened mine on the Mesabi range, that is, it is splendidly equipped for the work it has to do, and the rather unfavorable conditions there have been magnificently met. This mine has accumulated a stock-pile of 140,000 tons of ore since last fall, out of one shaft, with but a small force at work. It is to be an important shipper the present year. This mine was developed last year, and it is but a short time since the first underground work was done there.

At the Monroe are 160 acres of land, a large part of which is ore. Three shafts are now going down, placed east and west across the northern part of the center 40 acres. The easterly is shaft A, and is now at a depth of 170 ft., 60 ft. of which is in ore of excellent quality. This shaft is to rest at about 200 ft. for the present. Shaft B is down 90 ft., and is still in surface, and C is 160 ft., and in ore. The company started three shafts last fall, but had great trouble with quicksands, and has not made the progress desired on that account. A stripping contract of 2,000,000 cu. ft. is under way by the Killorin-Philbin Co., and about 160,000 yd. have been removed since the shovels started. One shovel was worked most of the winter, in spite of the severe weather. This contract is one of the largest that has ever been given on the Mesabi in a single deal. The scope of stripping here is interesting, as it indicates the difference of opinion now and a few years ago as to depths. The average of surface on the Monroe are from 80 to 100 ft., and much ground that will probably be taken off later is at least 120 ft. thick. But there is abundant ore below to warrant this outlay. The stripping will cover about 20 acres for the present. The mine will be equipped with electric underground tramming, and ore will be drawn north to the shafts from the south line of the property, beneath the stripping, which latter is for mining by the milling process. Drills have been steadily operated on the mine since its purchase last fall by the United States Steel Corporation, and it is understood that a number of the old holes have been re-drilled, ore having been found at a greater depth, and in large quantity, so that the tonnage upon which the mine was sold has been magnificently increased. Both this mine and the Howard were the property of the Chemung Iron Co., of which the late Henry W. Oliver and Chester A. Congdon, of Duluth, were owners.

At the Howard one shaft is going down, and is now in ore. This is a large property. Neither of these mines can ship this year, but both will later be exceedingly important mines.

Nothing will be done this year with the Mesabi range mines secured by the Steel Corporation in its purchase of the Clairton interests. Neither will the Champion, at Champion, Mich., which is included in the same deal, be operated this year. It has a very large stock-pile, more, probably, than can be shipped during 1904.

Shipments are under way from the Utica and one or two other mines on the Mesabi to the docks, on account of the Lackawanna Steel Co., though but in a small way so far.

There has been nothing in the nature of exploration work in progress for nearly a year by the Consolidated Lake Superior Co. Prior to that time it had been very active throughout western Ontario, including the region west of Thunder bay, the east side of Lake Nepigon, and the Michipicoten region. In the latter section there is no doubt the company discovered a new ore-bearing formation, similar in many respects to the Vermilion range of Minnesota. But its search for mineral in economically im-

portant quantities, though skillfully conducted, was not successful, except for what it found at the Helen mine, and for the prospects of a better find at the Josephine. Its diamond drilling at the latter was suspended at the time of its financial difficulty. It is true, however, that in the Josephine the company has what may prove an important mine. It is stated that one of the first undertakings of this company, upon its reorganization, will be the reopening of its mines and the recommencement of its explorations.

In Minnesota, on the Mesabi range, a good deal of exploration is going on in the vicinity of the Miller mine, in the north part of township 58-15. Five drills are working on an 80-acre tract of the Longyear Mesabi Land & Improvement Co., under the direction of E. J. Longyear, and a row of holes across a 40 has been put through ore of good quality. Holes to the north have cut into granite, and to the south they have been in slate. There are several million tons proved. Mr. Longyear expects to continue this exploration for some time. A very interesting and important fact has been evolved by means of this work, in the discovery of granite to the north of the orebody, for this mine is 2 miles due south of the Stephens, where the Oliver Iron Mining Co. has an enormous property. It has been the accepted theory that granite on the Mesabi was the older and north rock. But it now appears that a tongue of granite cuts off from the projection running into the ore-bearing formation in section 33, this town, and divides the ore-formation into two parts, in one of which are those mines in the north part of 58-15, and in the other the main strike of the range, through the Stephens, off to the northeast. This accounts for the discoveries of ore in sections 3, 4 and 5, 58-15, which in the earlier days seemed too far south for successful exploration, and may lead to more ore still further east along the same strike. It is a fact that options for exploration have been given within the past few days on lands in section 2 58-15 and in 35 and 36 of the township north, and that work in these explorations commences shortly. This clearing up of a puzzling question by the discovery of this granite opens a series of similar questions at one or two other points on the Mesabi. This granite is of a feldspathic character, and rock that was found in other holes in section 4, and then called an altered taconite, is now seen to have been the same as is now found north of the ore in section 3.

A drill will be placed on the Turney lands in section 24-58-18, where there are some ore indications. The probability is, though, that whatever ore may have existed in this section ages past has been eroded; at least such is the appearance of character of the surface.

San Francisco. May 11.

(*From Our Special Correspondent.*)

The River Convention of this State meets at the Palace Hotel, San Francisco, on May 23, at which time it is intended to discuss matters relating to the present conditions of the main rivers and make suggestions as to their improvement. Some half million dollars are being spent jointly by the Government and the State of California at present, in erecting barriers at Daguerre Point on the Yuba to prevent the debris in the channel from coming further down to the injury of navigable streams below. These dams are not intended as restraining barriers behind which miners may continue to dump their hydraulic tailings, as, under the present laws, each mine must impound its own debris. But there are millions of cubic yards of tailings deposited before there was any law against it, and these advance with each flood season further down. The dams are not yet built and this winter the preliminary foundations were washed out. The floods in the Sacramento valley this year had a worse effect than ever. The reclamation of river banks and tule islands has confined the streams within narrower boundaries than in former years, giving the waters no chance to spread out where there is only a slight fall. It is calculated that over the entire Sacramento water-shed of 26,000 square miles there will occasionally be a year when an average of 30 in. of rain will fall in three months. Experience has proved this. Yet the reclamation of river channel islands continues and the river is more closely confined each year. It is questions connected with this that the River Conventions are to discuss. The proposition is an engineering one and hardly to be settled by a convention. The convention people can, however, talk of the question of where the money is to come from to bring about a method of reclamation which will not narrow the river channels and cause floods whenever we have a wet winter.

The mining industries of the State are interested in these matters because there is a tendency in some quarters to lay all the blame on mining, because there is so much debris in the rivers. But the water gets past all that debris all right. It is only when it comes against the leveed tule islands in the lower river that it backs up, breaks through and does damage. But the preservation of the entire river system is to be considered, and the California Miners' Association, at first overlooked, has been asked to send delegates. Their delegation will have to be prepared to meet any arguments brought forward by the Anti-Debris Association delegates tending to prove that the miners are responsible for the whole thing.

The contest over the application of the Balaklala Mining Co. of Shasta county for a patent for the Blenheim group in Flat creek district has been declared off, as was that for the McKinley group in the same district some time ago.

Creditors of the McCloud River Electric Power Co. of Shasta county have petitioned the court to declare the company insolvent. The president and secretary have let the State, leaving the company without a business representative.

Large sales of dredging ground continue to be made, particularly in the vicinity of Marysville. One sale in that region was for $200,000; another for $360,000, and one is now pending for 2,700 acres of valuable land to an English syndicate for a large sum. After all the talk about the proposition of buying out the residence and business district of the town of Oroville and dredging the ground of the town site it seems that no experienced dredge-men ever gave the matter any consideration. Mr. W. P. Hammon says the idea is a foolish and impracticable one and would not pay. Mr. James H. Leggett has the same opinion and thinks estimates of $15,000,000 value in the town-site two-thirds too large. Moreover, the pay streak does not cover the town-site, but only part of it.

The dredger men up around Oroville have formed an association for mutual protection. Why they did not join forces with the California Miners' Association is not clear, since that body is large and influential, while there are comparatively few engaged in the dredge industry. These men fear that they may be attacked as the hydraulic miners were, and the formation of this association is preliminary to any possible contest against one dredge for stirring up debris in the river which may be deposited elsewhere.

The miners who struck at the Fremont Consolidated mine, in Amador county, because the superintendent would not discharge a member of their union who was behind in his dues, finally agreed to return on the same basis of wages and hours as before. But when they reported for work on Monday morning last they wanted Manager Goodall to take back everybody without exception. This he refused to do, objecting to two or three union men. Therefore, they all declined to go to work. The surface men and engineers did not go on strike with the underground men.

The city of San Diego has received a setback in its ambition to have a smelter. George P. Brown, superintendent of the Esperanza mine on Cedros Island, has acquired all liens, claims, etc., against the National Smelting & Refining Co. on behalf of W. R. Nicholson, of Philadelphia. The partially completed plant is at National City, at the lower end of San Diego bay. The company is given 90 days in which to pay all these claims and redeem the plant. If not redeemed the whole plant will be removed to Lower California, either to Cedros Island or some camp on the main land adjacent. Mr. Brown says the reasons for the move are that the smelter cannot be operated at San Diego within $5 per ton as cheaply, as at the mines, on account of freight on the ore.

At the Kennedy mine, Amador county, they have finally shut down the mill and works at the old shaft through which so many millions in gold have passed. They will move the old 40-stamp mill over to the new 60-stamp mill at the east shaft and all the milling will hereafter be done at that point. All the mining will be done at the east shaft.

It is reported that the famous old Redington quicksilver mine at Knoxville in Napa county, now known as the Boston, has been finally closed down, the ore being of too low grade. The mine is equipped with a 60-ton Scott furnace.

The Keswick smelters, buying quartz for flux, are not only helping Shasta county gold miners, but those of Siskiyou county also. Notwithstanding the distance from the smelter many small mines are sending ore for treatment. They get $2 per ton for the flux and a liberal percentage of the value of gold contents.

Spokane. May 12.

(*From Our Special Correspondent.*)

The Red Boy mine in eastern Oregon, near Baker City, was sold by the sheriff at a receiver's sale May 10 to Alexander Prussing, of Chicago, representing a syndicate of the stockholders, for $80,000. The plan is to start work as soon as the court confirms the sale. The Red Boy was consolidated several years ago with the Concord, an adjoining property. It has a good plant, but has been out of ore. It has run heavily in debt, and the receivership was the result.

Alfred Burch and Fred. Burbidge, of Spokane, each of whom was formerly manager for the Bunker Hill & Sullivan mine, in the Coeur d'Alenes, are pushing work on the Crane gulch placers, in Grant county, eastern Oregon. They plan to put in a dredge.

Frank Brown, manager of the Jumbo mine, in Buffalo Hump, has come out of the central Idaho camp with the April clean-up, which is estimated at $16,000. The mill ran 14 stamps for three weeks and 24 stamps for the rest of the month.

The Snowstorm mine at Mullan, Idaho, which had been shipping to the Tacoma smelter at the rate of 150 tons of copper ore daily, has laid off 55 men and has cut shipments to 50 tons, on account of the lack of a market for the full output. The upper workings have been leased to a company including Thomas Greenough, of Larson & Greenough, owners of the Morning mine, at Mullan. The ore is a low-grade copper. George Waterbury, of Denver, is figuring on putting in a leaching plant to handle the ore.

Governor Morrison, of Idaho, has announced that work on the wagon road into Thunder mountain will be pushed as soon as a survey is completed for the last part of the road, by the east fork of Salmon river. The survey will give opportunity to compare the cost with the expense of building by the southwest fork of Monumental creek.

H. C. Bellinger, superintendent of the Crofton smelter on Vancouver island, B. C., is in the city on his way to inspect the Robinson smelter at Bingham, Utah. Mr. Bellinger has closed the Crofton plant pending the getting of fresh ore supplies. Meanwhile, two propositions for the sale of the smelter are being considered. The liquidator of the Leonora mine, at Mount Sticker, B. C., is floating a deal in London to take over the Leonora, the Crofton smelter and some other properties. Mr. Bellinger will remain as manager. It is announced that the Howe Sound Co., recently floated to take over the Britannia mine on Howe Sound, B. C., is also negotiating for the smelter.

H. Pemberton, of Montreal, is expected here this week on his way to the Boundary district of British Columbia to start the Boundary Falls smelter of the Montreal & Boston Consolidated Co., a new corporation floated with Montreal and New York backing to take over the old Montreal & Boston Copper Co., the Sunset mine, the Brooklyn group, the Morrison mines and some other Boundary properties. The Morrison Mines, Ltd., a Spokane corporation owning the Morrison, completed a deal for the sale of the property to the new concern, but an injunction against the sale was secured by some of the minority stockholders. It is expected that no fight will be made by the majority

against the maintenance of the injunction, but that the new Montreal & Boston Co. will be sold such a large majority of stock by the individuals as to give the new company control of the Morrison Mines, Ltd., without a formal sale of its assets.

Lewis P. Larson, who represents Peter Larson, of Larson & Greenough in the operation of the Last Chance group near Northport, Wash., is putting in two small trams on the mine to facilitate shipments. The mine is working 40 men.

Judge Morgan, of Shoshone county, Idaho, has issued a permanent injunction restraining the sheriff from selling a part of the assets of the California Consolidated Mining Co. for debt. In 1893 George McAulay, of Spokane, was in the banking business in the Coeur d'Alenes, and failed. The receiver of the bank got a judgment of $58,000 against him and attached the California mine to satisfy the judgment. The California Co. has successfully fought the attachment on the ground that the mine has been sold by Mr. McAulay a year before his failure, and that it was not his property.

Spokane men are interested in the fight for the coal lands of East Kootenay, B. C., which they are claiming under locations made within the past 18 months. Several syndicates have been formed here, and claims amounting to hundreds of square miles have been staked. Judge J. Z. Moore has been at Victoria, B. C., to represent the interests of Spokane men.

Charles Sweeny has practically completed his deal with the Sullivan Group Mining Co. to take the bond issue of $100,000 offered by the company, and to complete the company's smelter near the mine at Marysville, B. C. The mine is a low-grade lead property.

Victoria. May 10.

(From Our Special Correspondent.)

Boring for oil at Stevenson is now in progress. The plant is designed to drill to a depth of 1,800 ft. if necessary, but it is expected the shale will be reached at 1,000 ft or less.

In the Atlin district the Bull Creek Hydraulic & Dredging Syndicate is resuming acaive operations in the Dixie creek valley. This is a new section of country from which last year very satisfactory results were obtained.

Several deals are reported to have been made in the Lardeau during the past month; among others the Lily group, a promising property on Menhinick creek, has been acquired by a development company. Prospectors are now returning to Poplar creek, but not in the numbers that were expected.

The last shipment of silver from the Trail refinery was 54,000 oz., to Shanghai, China. A shipment of 550 oz. fine gold was made at the same time for the same port. Pig lead shipments have been made regularly to Montreal and other Canadian cities, mostly for home consumption.

At the Hall Mines smelter the second furnace was blown in last week, in order to treat a large tonnage of concentrates from the Highland mine at Ainsworth.

The Five Metals Mining Co., operating at the head of Haughton and Gray creeks in the Nelson mining division, propose to begin shipping ore, and a road is now being cut to the property.

At the Wilcox mine, at Ymir, a new aerial tramway is being erected, to carry the ore from the upper tunnel to the ore bins near the wagon road.

The Donnelly group, near Sandon, has been leased for two years. The mine has access to two railways. A strike of 14 in. of galena ore is reported to have been made on the Majestic and Unexpected properties on Payne mountain.

The Ivanhoe mine now employs two shifts of 90 men. The company has just signed another contract to send another 500 tons of zinc to the Iola Smelting Co., Kansas.

Monterey. May 11.

(From Our Special Correspondent.)

During the last month quite a change has taken place in the personnel of the Mexico City offices of the National Metal Co., the largest ore-buying company in the Republic. Mr. A. J. Rawlings, former general manager, has gone to take charge of the London office, and is succeeded by H. P. Lewis, one of the younger members of the firm. W. H. Praetorius, former auditor, has been transferred to the New York offices, and H. A. Eye, who was for years with the American Smelting & Refining Co. in the United States, and more recently with the San Luis Potosi smelter, has taken his chair. The office force is in charge of H. L. Woodbridge, formerly with the San Luis Potosi smelter.

A most sweeping concession is being sought by a London company, with offices at 17 Throgmorton Square, London, and a capital of £100,000 or $1,000,000 Mexican, which will permit it to prospect anywhere in the Republic for any known substance, to purchase any piece of ground they see fit and erect plants for the extraction or production of any metals. The request sounds as if the company wished to control the earth, but boiled down is only, I suppose, a new mining and exploration company.

California people are negotiating for Los Gallos property, in the San Jose del Oro district, near Pachuca, State of Hidalgo, and if taken the new company will put in a 100-stamp mill.

At El Oro, the El Oro Mining & Railway Co. is figuring on an 100-ton cyanide plant. Los Ocotes company has made some nice strikes in the last two weeks.

Chicago people are starting development work on the old copper property known as the Rosa Amavilla, near Natividad, and a day's ride from Manzanilla, on the west Mexican coast.

F. W. Page, general manager of the United Mexican Mining & Milling Co., has ordered from the Allis-Chalmers Co. full equipment for a 10-stamp mill, with concentrators, pans, roasters and chlorination plant to do custom work on the Tatuani river, in the Natividad district. This will be of great benefit to the San Roque, of Messrs. Malone & Pulver; the Soledad, of Gov. W. T. Thornton, of Guadalajara; the Frontera group, of the Dwight Furness Co., under the management of Wm. Oliver, and the San Pedro, also owned in Guadalajara. In the Hurtado district, the Lukita Mining Co., under the management of P. Fitzgerald, is enlarging its plant and production, and work is being pushed on the Rosario group, south of Lupita, owned by the Dwight Furness Co., by sinking a two-compartment shaft, driving an adit, and drifting on the vein.

Saltillo. May 11.

(From Our Special Correspondent.)

One of the largest mining deals that has ever been made in the Republic was the taking over of the Velardena Mining & Smelting Co.'s properties by the Guggenheim Exploration Co. The deal was closed on the valuation basis of $10,000,000, the Guggenheim Exploration Co. acquiring 60% interest in all the company's holdings, paying $5,000,000 in cash and guaranteeing to expend $1,000,000 more in improvements and developments. The other 40% is to be held by the Velardena company, in which E. W. Nash, president of the American Smelting & Refining Co., Matthew Dahlgren, Charles Wilhelm and the estate of James K. Matthews, are stockholders. The mining claims comprise about 2,500 *pertenencias* and cover a total area of more than 6,000 acres. The most prominent of the group of mines are the Terneres and Santa Maria, yielding ores of silver, lead and gold, and the Copper Queen, a silver and copper producer. The railroad which connects Velardena with the railway station on the line of the Mexican International Railroad had been extended to the latter mine, a distance of 24 km. The company has been operating these mines since 1889 very successfully.

Indian miners from the Autlan district of Jalisco will show visitors to the St. Louis Exposition how copper ores were mined and treated in ancient days in Mexico. The Indians passed through this city on their way to St. Louis in charge of John Dee, an American mining man of Jalisco. A miniature copper mine and ancient copper smelter will be in operation during the time of the Fair.

London. May 7.

(From Our Special Correspondent.)

Last week I mentioned that an action had been brought by the Lake George Mines, Ltd., against Antony Gibbs & Sons, of London, Gibbs, Bright & Co., of Melbourne, and others, alleging fraudulent representation in connection with the property sold by or through the defendants to the plaintiff company. In recording the commencement of this action, I said that I preferred not to enter into details until the trial was concluded and the whole of the facts and motives were disclosed. The end has come quicker than I anticipated, for the judge and jury soon began to read through the lines, in a way not always possible in a court of law, and to discover that it was an action brought speculatively, by people who had comparatively recently acquired Lake George shares at a rubbish price, and that the particular defendants were pounced upon because they had the most money of all the people connected directly or indirectly with the promotion of the company. It would not be possible in this column, even if it would serve any good purpose, to go into the history of the Lake George mine and the details of this trial. The main facts are that Gibbs, Bright & Co. are the agents of Antony Gibbs & Sons in Melbourne, and are merchants of considerable eminence, handling all kinds of business. As Antony Gibbs & Son did not take much interest in mining matters, arrangements were made with the Exploration Co. (this was in Hamilton Smith's day) for the latter company to have the option to introduce in London all mining propositions brought forward by Gibbs, Bright & Co. The Lake George Mines, Ltd., and the Sulphide Corporation Ashcrofts Process, Ltd., were two companies introduced in London in this way. The arrangement did not last long, for in both of these cases it was found that the properties and processes were much over-valued and internal dissensions caused thereby terminated the relationship of the two groups. It is a matter of common gossip that the London people were the victims of the machinations of the Melbourne crowd of speculators; and people are to be found who allege that Gibbs, Bright & Co. were not sufficiently careful to investigate the good faith of the vendors of the properties. Such evidence as was brought, even by the plaintiffs in this case, did not disclose any moral obliquity on the part of any of the defendants, though, according to the standard now adopted by the mining profession, there was a good deal of carelessness and perfunctoriness shown in the handling of big propositions. All this, however, is by the way, and had nothing to do with the case. As I have already said, the motive of the case was the desire of certain speculative prosecutors to get something out of Antony Gibbs & Son, preferably by a settlement before it came into court. Under the circumstances, it is best to obliterate the Lake George prosecution from our memories.

The future of Mason & Barry, owning the San Domingos mine in Portugal, depends almost entirely on the sulphur ore. There is practically no more copper ore in the mine, and the output of the metal is entirely from the waste heaps, which, however, will last for some time yet. There are millions of tons of sulphur ore in the mine, and during the past year or so money has been spent developing these deposits and providing suitable machinery for handling the ore. Before long the Rio Tinto will be the sole remaining one of the three great copper producers of Spain and Portugal; but chemical manufacturers in Great Britain are not a little glad to know that both the Tharsis and the Mason & Barry will continue indefinitely as pyrites producers. Chemical manufacturers in the north of England often declare, half in joke and half seriously, that they only exist by the complacence of the Rio Tinto Co., and they would rejoice if new discoveries of pyrites were made, so as to bring prices down. What would happen to them if the other present producers ceased to exist is a matter they do not care to contemplate.

Johannesburg. April 11.

(From Our Special Correspondent.)

During the past two weeks there has not been a cloud in the sky to mar the brilliant sunshine. Some say that this is the cause for the diminution of the plague, for, as is well known, sunshine is a powerful germicide, especially of the bacillus *pestes bubonicae*, the agent of bubonic plague. Whatever the cause, there have been few new cases, and there is every reason to be-

lieve that the disease is well in hand, and that an epidemic is now highly improbable. Last week the long talked of destruction of the coolie settlement, which has been an eyesore to the community for months, was carried out. A wall of sheet iron, embedded in earth, was built around the entire place, thus ensuring that no rats, or other plague-infected animals, would escape from the area into the city. Bands of Kaffirs were ready with sticks to kill the droves of rats which people said would rush from the burning houses. They say that rats leave a sinking ship; they also leave a doomed habitation. Instead of hundreds of rats the Kaffirs only killed a tiny mouse; also a small cur and an old hen. The East Indians have all been moved to the new site five or six miles from Johannesburg, and will not be the same menace to the health of the community as they were when their settlement was near the center of the city. To date, the deaths from plague in the Johannesburg municipality are as follows: Whites, 7; colored: Malays, 1; Asiatics, 51; natives, 9; total, 68.

The mining regulations regarding Good Friday were carried out fairly well this year. The law is that work shall cease from 12 o'clock Thursday night until 12 o'clock Friday night. All kinds of labor took advantage of the opportunity to have a grand Labor Day. There was a procession, a big concert and much speechifying. It is a significant fact that W. T. Stead, who is in Johannesburg, was not asked to speak at this labor gathering. The past record of the man with the Boer cause in South Africa, especially his speeches since he arrived in this country a month ago, have made him obnoxious to most British subjects in South Africa.

The second annual meeting of the South African Association for the Advancement of Science came to a close last week. It was feared that the plague scare would militate against a successful meeting, but in spite of this, the meeting was very satisfactory. A large variety of papers was submitted in the different sections, some of them bearing on the great industry of the Transvaal, and others on different branches of applied science. Pure science was scarcely represented at all, though this country is in need of it. There was quite a number of visitors from other parts of South Africa. Numerous excursions were made to different points of interest, such as Pretoria, the Premier Diamond mine, etc. Although the association is young, already there are 913 members and 124 associates.

The total output of gold for March has been declared at 308,242 oz., being an increase for the Transvaal of 18,740 oz. The output of the Witwatersrand is 299,625 oz., showing an increase of 17,189 oz. It was confidently believed that there would be a substantial increase for March, for it is a long month. It is doubtful whether the month of April will show an increase. One point of interest is the fact that the percentage of sorting is considerably higher than it was a few months ago. This was to be expected, for the small amount of waste rock discarded a year ago was due to the scarcity of native labor. Now that the labor market is better, efforts are made to improve the value per ton crushed. On many mines, Boer youngsters of 14 to 15 years are employed on the sorting tables. They receive 72 to 96c. a day, and are fairly efficient. In this way a certain number of Kaffirs are released for work underground.

Some time ago Mr. Wyberg, the commissioner of mines, resigned. No successor has been appointed to fill the position, and it is rumored that the office will be done away with, in order to curtail expenses. If curtailment of expenditure is necessary, some office of less importance than the commissioner of mines should be dropped. It is absurd to have a commissioner of railways, for instance, and not a commissioner of mines. One trouble is the difficulty of finding a suitable person to fill the important post. Several local aspirants are strongly hinting their claims, but no one, save themselves, believes in their ability to fill the important post. There are a few men on the Rand who would make excellent commissioners, but these men are not available, being too much engrossed in private mining enterprises. One thing the Government has learned, and that is that it is better to have no commissioner of mines than to have the position filled by a mere figure-head.

LANE CARTER.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodations in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. Victor M. Braschi, of Mexico City, is in New York.

Mr. J. W. Mercer left New York for Denver on May 18.

Mr. Leigh Hunt has returned to New York from Egypt.

Mr. Edmund Juessen, of Spokane, is visiting New York.

Mr. J. W. Sutherland is visiting London from Kalgoorlie.

Mr. Georges Le Royer, of Buenos Ayres, is on his way to Paris.

Mr. E. E. Chase, of Denver, is in Butte on professional business.

Mr. W. W. Mein is manager of the Robinson mine at Johannesburg.

Mr. S. L. Bensusan has reached London from New South Wales.

Mr. J. W. Craig is manager of the Tudor Gold Mining Co. in the Transvaal.

Mr. J. Norton Griffiths has been examining the Nile Valley Co.'s mines in Egypt.

Mr. Guy Ricketts has returned to London from a prospecting expedition in Burmah.

Mr. P. Q. Treloar is general manager of the Roodeport Central mine at Johannesburg.

Mr. F. C. Roberts, of Mexico City, has been inspecting mines at Guanacevi, in Durango.

Mr. T. L. Dawson is manager of the Wei-Hai-Wei Gold Mining Co. at Wei-Hai, in China.

Mr. Frank Fowler, Commissioner of Land and Mines in British Guiana, is now in Canada.

Mr. A. A. Steel, of the Engineering Co. of America, is examining mines at Keystone, South Dakota.

Mr. Hyman Herman has been appointed assistant manager of the Mt. Bischoff tin mine in Tasmania.

Mr. E. W. Sebben, of Denver, recently inspected the Clover Mountain mines at White Pine, Colorado.

Mr. S. W. Eccles, traffic manager of the American Smelting & Refining Co., was in Colorado last week.

Mr. P. S. Couldrey, manager of Le Roi No. 2 mine at Rossland, sailed by the *Umbria* for a holiday in England.

Mr. Louis Chevrillon was in Chicago this week, selecting machinery for the mines which he directs in Puebla, Mexico.

Mr. Wm. Magenau, of Omaha, goes to Trail, B. C., to become the cyanide metallurgist of the Rossland Power Company.

Mr. C. A. Bohn is now night superintendent at the plant of the American Smelting & Refining Co., at Monterey, Mexico.

Mr. Percy Widdas, of the Durham College of Science, England, arrived by the *Campania* on his way to the coal-fields of Pennsylvania.

Mr. W. W. Wishon, superintendent of the Speculator mine at Butte, is at the Jewish Hospital in St. Louis, where he underwent an operation.

Mr. J. C. Fowler, of Central City, Colo., has returned after a visit of several weeks to mining districts in Washington, Oregon and British Columbia.

Mr. George J. Hoffman is now consulting engineer of the Lancaster, Lancaster West, Tudor and Roodeport Central mines in the Transvaal.

Prof. Regis Chauvenet, of Denver, formerly president of the Colorado School of Mines, has been examining mining property in Gilpin county, Colorado.

Mr. W. A. Price, former manager of the American Smelting & Refining Co., at Salt Lake City, has been appointed financial agent for that company at Mexico City.

Mr. S. F. Parrish, manager of the Le Roi mine at Rossland, B. C., has been compelled to undergo a second operation at Spokane, Wash. He is recovering satisfactorily.

Mr. E. E. Eshenshade, superintendent of the finishing mills of the LaBelle Iron Works, Steubenville, O., has resigned and has been succeeded by Mr. H. K. Williams, of Warren, O.

Mr. Martin Wagner has resigned as mining captain for the Calumet & Hecla Mining Co., of Michigan. He was in the service of the company for over 20 years, and his retirement is due to failing health.

Mr. Karl Eilers reached Salt Lake City recently, after an extended trip to the plants of the American Smelting & Refining Co. He intends to remain a few days at Denver before returning to New York.

Messrs. A. Chester Beatty and Cortland B. Palmer, of the Guggenheim Exploration Co., leave Mexico this week for London, to be present at the June meeting of the Esperanza Mining Co., of El Oro, Mexico.

Prof. Albert W. Smith, head of the department of mechanical engineering at Leland Stanford University, succeeds the late Dr. H. H. Thurston as director of Sibley College of Mechanical Engineering of Cornell University.

Mr. Harry Bullock, formerly mechanical engineer for the Mineral and Union collieries, with headquarters at Shamokin, Pa., has been promoted to the position of a division engineer for all the collieries under the Susquehanna Company.

Mr. Frank G. Stephens, superintendent of the Le Roi No. 2 Co.'s properties at Rossland, B. C., has resigned to accept the superintendency of the Guanajuato Consolidated Mining & Milling Co.'s properties in Mexico, of which Mr. E. M. Macdonald is general manager. He will be succeeded by Mr. D. R. Thomas.

Mr. C. C. Burger, of the staff of Mr. John Hays Hammond, and Mr. F. J. Siebert, formerly superintendent of the Tonopah Mining Co. in Nevada, have joined forces as consulting mining engineers. Mr. Burger's headquarters will be in the Broad Exchange Bldg., New York City, and Mr. Siebert's in the Braly Bldg., Los Angeles, California.

OBITUARY.

Edward S. Silliman, one of the pioneer coal operators of Schuylkill county, Pa., died recently, aged 84 years. He put up the first breaker in the Mahanoy valley in 1861, and soon shipped coal which was the first sent to market from the vicinity of Mahanoy City. Besides having interests in coal mining, he organized the National Bank of Mahanoy City and was its president for nearly 40 years. He organized the Mahanoy City Water Co. and was its president up to the time of his death. He also organized the Mahanoy City Electric Light, Heat & Power Co., and was the first mover in the organization of the Mahanoy City Gas Co. He was well known in the financial affairs of Schuylkill county, and was highly esteemed for his executive ability and business judgment.

SOCIETIES AND TECHNICAL SCHOOLS.

AMERICAN CHEMICAL SOCIETY.—The thirtieth general meeting will be held at Providence, R. I., on June 21, 22 and 23. The first session

will be at Rockefeller Hall, of Brown University. Dr. Wm. H. P. Faunce, of Brown University, will deliver an address of welcome, to which Dr. A. A. Noyes, president of the society, will respond. Subsequently papers will be read by members of the society, and excursions made to various points of interest.

OHIO IRON MEN'S CLUB.—At a meeting of the Ohio furnace interests in Cleveland on May 4, the Iron Men's Club was organized. The headquarters of the club will be in Columbus, O., and regular meetings will be held on the first Wednesday of each month. The club begins with a membership representing about a dozen furnace companies. The officers elected at the Cleveland meeting were the following: Col. J. G. Battelle, of the Columbus Iron & Steel Co., president; D. B. Meacham, of the Cleveland Furnace Co., vice-president; Linn Bentley, of Fieser & Bentley, Columbus, O., secretary and treasurer. There was no action taken at the meeting regarding prices or number of pounds per gross ton.

INDUSTRIAL.

The Tennessee Coal, Iron & Railroad Co. will move its New York offices to Birmingham, Ala., about June 1. The treasurer of the company will be its only representative in this city after that date.

The Goodman Manufacturing Co., through its western agents, A. E. Lindrooth, Shubert & Co., and S. F. Farnham, has sold to the Sheridan Coal Co., of Dietz, Wyo., two 200-k.w. generators, nine electric locomotives and nine mining machines and equipment.

The Locomotive & Machine Co.'s works, at Longue Pointe, near Montreal, recently taken over by the American Locomotive Co., has received orders for 13 new engines from the Grand Trunk, Canadian Pacific, Toronto and Buffalo, and Cape Breton railways.

A syndicate headed by M. D. Chapman, of New York, has bought the iron furnace, at Goshen, Va. Improvements have been projected that will cost $50,000. The company will be known as the Chapman Iron, Coal & Coke Co. The furnace has a capacity of 200 tons a day.

The Otto Gas Engine Works, it is reported, has decided to remove its plant from Philadelphia to Wilmington, Del. A tract of 57 acres is to be purchased in South Wilmington. Ground will be broken in a short time, and building will be rapidly pushed.

The Cape Breton Iron & Steel Co., Ltd., has been incorporated with a capitalization of $250,000, par value of shares $50. The company proposes to manufacture steel, iron and brass castings and similar products at Sidney, Nova Scotia. K. J. Morrison, of the Dominion Iron & Steel Co., is president; P. R. Bently, vice-president, and F. A. Hatfield, secretary and treasurer. Other directors include R. M. Langille, J. W. Maddin, H. C. Le Vatte, C. P. Moore, and R. Harrington. Two steel buildings will be erected, each 100 ft. wide by 150 ft. long, one of the buildings to be used as a steel and iron foundry, the other for a machine and forge shop. Another building 40 ft. by 50 ft. will be used as a clipping room for castings, etc.; pattern and carpenter shop 35 ft. wide by 60 ft. long; power station, containing boiler, engine, electric generator, air compressor, etc.; office building; storage building; gas producer, etc. It is the intention to erect the plant in sections putting each into operation as soon as it is completed.

The Bullock Electric Manufacturing Co. has planned a number of enlargements to its Cincinnati plant. The extension to shop No. 2 will be equipped with light machine tools, for the production of steel car motors. About 300 ft. will be added to shop No. 3, the heavy machine shop. This building will be equipped with heavy machine tools of various types used in the building of electric generators, to be connected to the steam turbines which will be built by the Allis-Chalmers Co. at the West Allis plant. These two new shops, it is reported, will require about $150,000 worth of machine tools. It has also been decided to build a large four-story structure opposite the foundry recently acquired, to be fitted for pattern making and storage. Two of the Allis-Chalmers-Bullock turbo-generators are now in operation at the Cincinnati plant. One is a 1,500 k.w. machine, running at 1,800 revolutions, and the other is about a 1,000 k.w. set, running at 1,200 revolutions per minute. Both machines are to be exhibited at St. Louis.

TRADE CATALOGUES.

The Broderick & Bascom Rope Co., of St. Louis, Mo., manufacturers of wire rope and cordage, has issued a vest pocket map and guide to the World's Fair, which will be sent free on receipt of a 2c. stamp. The company will also distribute a novel blotter to all customers who visit its department at the World's Fair.

Bulletin No. 1021, just issued by the Denver Engineering Works Co., of Denver, Colo., is devoted to the box electric rock drill, which the company has had on the market for a year and a half. The advantages of an electric drill over one operated by steam or air are briefly mentioned, and the comparative efficiency of eacn is shown. The advantages of the mechanism and action are also mentioned, aided by a number of well chosen illustrations.

A neat catalogue of direct-current generators and motors, from 2 h. p. to 1,500 kw., for lighting power and railway service, is being sent out by the National Electric Co., of Milwaukee, Wis. A number of excellent cuts of the different types are shown, supplemented with brief but valuable data relating to the machines when in operation. The more important parts of the machinery, such as the armature, pole pieces, brush holder mechanism, bearings, etc., are dealt with in detail, the advantages of each being set forth in a comprehensive manner.

GENERAL MINING NEWS.

Pennsylvania Railroad Co.—Coal and coke shipments originating on the company's lines east of Pittsburg and Erie, for the week ending May 7, and year, are reported as below, in short tons:

	Week.	—Jan. 1-May 7.— 1904.	1903.
Anthracite	82,985	1,473,137	1,616,412
Bituminous	524,197	9,572,116	9,579,204
Coke	188,937	2,992,382	3,496,101
Total	796,119	14,037,635	14,691,717

Shipments of anthracite this year show a decrease of 143,275 tons bituminous, only 7,088 tons, and coke, 503,719 tons, making a total falling off of 654,082 tons, or about 4.5%.

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—This company, at Clifton, reports that its production of copper for the month of April was equivalent to 1,173 tons, of 2,000 lb. each.

CALIFORNIA.

AMADOR COUNTY.

Fremont Consolidated.—The strike at this mine, Drytown, was declared off, but as the manager refused to take back certain men, it is again on and the mine practically idle.

Kennedy Mining & Milling Co.—At this property, Jackson, work at the old shaft has stopped and 40 men discharged. The old mill is to be moved to the new East shaft, through which the mine will be worked in the future. The mine will now have 100 stamps.

Oneida Mining Co.—Rock is being milled from the 1,200-level at the 60-stamp mill of this property, Jackson, and 130 men are at work.

South Eureka.—About 30 men are cleaning out this mine between Jackson and Sutter Creek. The mill has been shut down temporarily and is expected to be enlarged.

Treadwell.—This mine near Volcano has been sold by Nixon & Guiliana to Portland, Ore., men. A 5-stamp mill has been secured and development will commence at once.

CALAVERAS COUNTY.

Benson.—The 5-stamp mill formerly at the Empire mine, Hodson, is being removed to this mine near Angels.

Cunliffe.—This mine near Esmeralda is adding more stamps to the mill.

Emma.—A rich strike has been made on the 400-level of this mine at Campo Seco, 250 ft. north of the shaft. The 10-stamp mill of the Bordina, owned by the same company, will be moved to the Emma at once.

Maltman.—This mine at Angels has been attached by miners and is closed pending settlement.

Royal Consolidated Mines, Ltd.—For this mine at Hodson, J. C. Kemp van Ee, manager, a new 12-in. pipe line, 10 miles long, is almost completed from Salt Spring reservoir to the 120-stamp mill of the company. The pipe line will also furnish the new chlorination plant with water. This plant is to handle sulphurets from the 160 stamps of the old and new mills.

Salvator.—This property near Whisky Slide has its main working tunnel in 1,300 ft., cutting three-ore shoots. H. C. Newman, the manager; has made arrangements to sink a vertical shaft to cut the veing 300 ft. below the tunnel level, and to extend the tunnel south on the vein about 4,500 ft. The mill will then be started and more stamps added.

What Cheer.—This gravel mine near Mokelumne hill is to have a new mill for crushing the gravel. J. H. Birch is superintendent.

ELDORADO COUNTY.

Kohn.—This mine near Smith Flat is showing up rich gravel.

Unity.—N. L. Kohn, who has found good gravel in this mine at Smith Flat, has purchased the interests of the other owners.

INYO COUNTY.

Lane.—This mine at Darwin, formerly a large producer, is again being opened and prospected.

Sacramento.—Work on this old mine is going on with good results. The vein being followed proves to be a continuation of the old ledge.

KERN COUNTY.

The strike at the Yellow Aster and some other mines at this place still continues, though the Yellow Aster has a number of non-union men at work. The striking miners are, many of them, at work on other claims in that vicinity.

NEVADA COUNTY.

Auriferous.—New machinery has been placed on this gravel mine and the new compressor started. There are 350 ft. more to run to reach the channel.

Gold Tunnel.—This mine at Nevada City has been started up again by B. F. Hall, of the Pioneer Reduction Works, and men have begun to clean out the drain tunnel.

Golden Crown.—John Tilton has started up this mine at Edward's Crossing and is overhauling the mill preparatory to a run.

Murchie Mining Co.—At this mine, Nevada City, a strike was recently made on the 600-level. The new canvas plant on this property is nearly completed.

Walling & Muller.—This mine in India Flat district has been bonded by A. P. Reddington & Co., of San Francisco. The old Nevada City mine adjoins it on the north. A new shaft is to be sunk and the mine developed.

PLUMAS COUNTY.

Red Slide.—At this property, Onion Valley, Geo. A. Sanborn, superintendent, they are still running bedrock tunnel and are now in 1,500 ft.

SAN BERNARDINO COUNTY.

Roosevelt.—This company at Camp Rochester is putting up a 10-stamp mill and the building is being arranged to cover 40 stamps.

SHASTA COUNTY.

Afterthought.—Men are clearing the tracks and tramways of snow and a speedy resumption of operations will result. Work with the Leyner drills has commenced on No. 3 level. The main working tunnel is in over 800 ft.

Gipson Ranch.—This ranch on Clear creek has been bonded by John White & Co. and will be prospected for dredging purposes.

Original Quartz Hill Mining Co.—This company, M. Maryanski, manager, is to build a small 30-in. tramway from the mine to the bridge at Keswick station to haul the quartz to the smelters by steam tram instead of by team.

Tiptop.—A suit to quiet title to this mine in Flat creek district has been brought by G. T. Cooper and A. D. Joslin against Estep, Thompson and Shaw.

SIERRA COUNTY.

Bellevue Mining Co.—Work in the extensive tunnel of this company at Gibsonville continues. It is about 6,000 ft. long. This is commonly known as the Thistle shaft mine.

Tabor.—In this mine at Gibsonville three shifts are driving the bedrock tunnel across the gravel channel, which is a part of that from which the Bellevue, or Thistle shaft people, have taken so much.

SISKIYOU COUNTY.

Cherry Hill.—This mine at Cherry Creek is shortly to be started again. Electric power is to be substituted for steam at the mill.

Mono.—At this mine, Punch creek, Humbug, they have struck the ledge full width of the new tunnel, which is 5 ft. across. The ore prospects well.

TUOLUMNE COUNTY.

Altadena.—The 10-stamp mill is nearly done and a full crew is at work in the mine.

Contention.—Owing to disagreement among the owners, this mine on Knight's creek will not be reopened at present.

Golden West.—The shaft is now free from sinking No. 2 shaft and for the necessary new water and sinking has been commenced. The shaft is 450 ft. deep and will be carried to 650 ft.

Mount Jefferson.—The roller mill and gasoline engine for the cyanide plant are in position and the plant will soon be in operation. The mine is at Groveland.

Republic.—The management of this company is arranging to run the plant by water power.

COLORADO.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Comstock.—Local owners are figuring on starting up this property at Central City under a lease to a local pool. The main shaft is down 300 ft. and machinery and buildings will be put up after an idleness of over 20 years.

Gold Dirt.—This group consisting of the Gold Dirt group of claims in the Independent district, 9 miles north of Central City, has been sold to Joseph R. Anderson and Pittsburg associates for a consideration of $120,000. The parties have been working the property for about a year under lease and bond, during which time they have opened up good ore bodies. The company figures on the erection of a 50-ton reduction plant, and will commence shipping smelting ores to the Denver smelters. W. H. Knowles, Perigo, Colo., is manager.

Hidee Gold Mining Co.—This property in Lake and Russell districts made a shipment to the sampling works which brought values of 7.9 oz. gold, 8.95 oz. silver and 8.65% in copper, or $165 to the ton. Sinking operations are to be resumed. Henry Fleuspach, of Central City, is manager.

Kansas Burrough Consolidated Mining Co.—The shipments for last month amounted to 145 cars, or 1,235 tons, a daily product of over 40 tons. Abount 100 men are employed, mostly on leasing system. R. Sykes, Central City, is manager.

Little Lallie Mines Co.—Incorporation papers have been filed, the company having a capital stock of $500,000. The company owns a group of claims in Silver Lake district of this county and has taken a lease and bond on the Murray, a silver-lead producer at Lawson in Clear Creek county. W. E. Garver, Lawson, is manager.

Toronto.—The large shaft buildings on this property in Enterprise district were destroyed by fire, supposed to be incendiary, entailing a loss of $3,000, with no insurance. Hugh Butler, of Denver, and S. Hoskin, of Central City, are owners. The hoisting plant escaped injury.

Waltham Mines, Ltd.—Lessees have shipped ores bringing returns of $130 to the ton for concentrates taken from the jigs and of $54 per ton for concentrates from the tables. E. M. Messiter, Central City, is manager.

Robert A. Lee.—Chicago parties are the purchasers of this group in Hawkeye district for the reported sum of $10,000, and intend to install machinery and develop.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Anna.—The discovery of good gold ore by lessees on this virgin ground has caused much activity in that part of Iowa gulch. Some of the ore from the Anna is being sacked and runs 16 oz. gold.

Big Four Mining Co.—At the annual meeting the reports showed a very satisfactory progress made by lessees on the Big Four and Gold Basin shafts. The following were elected officers and directors: J. R. Case, Chicago, president; R. A. Stewart, Chicago, vice-president; L. Z. Farwell and R. K. Farwell, Freeport, Ill., respectively treasurer and secretary. These gentlemen and J. W. Henney, Freeport; J. H. Remick, Detroit, and W. H. French, Reedsburg, Wis., make up the board of directors.

Diamond Gold Mining Co.—About 100 tons daily are being shipped while the ore is being followed in on virgin territory on the Diamond and the Vega combination.

Fortune.—The Raney lease having expired, the two shafts of the Fortune will be operated by the owner, Jas. McNeece, who has already made heavy shipments of rich gold ore.

Harvard.—In this new shaft a fair grade ore has been encountered, which promises improvement as developed.

Huckleberry.—The new ore shoot recently encountered is being opened up with very satisfactory results.

Ibex Mining Co.—Shipments are being increased from Nos. 4 and 5 shafts, and a new copper ore-body is being opened up below the 1,300-ft. level. Much new work is planned below this point, where the connections were recently made with the Yak tunnel. The remaining part of the combination to be operated through Nos. 1, 2 and 3 shafts is to be leased in the near future.

Killarney.—Philadelphia people are back of the lease on this ground, including four claims. Numerous tunnels are being run, and there is pay ore in sight in all of them.

Last Chance.—The main tunnel is now in 400 ft., and the ore streak being followed shows 18 in. It is an iron-copper sulphide and flaked with native silver.

Mountain Lion.—The main tunnel into Mosquito is in 200 ft. The company owns 24 patented claims, and is figuring on much important work.

Murtha.—Two tunnels are being run, the upper tunnel being in 500 ft. and the lower 320 ft. Considerable low grade material is showing, which is improving.

Nil Desperandum.—The new Moffat shaft has cut the ore which is being opened up and regular shipments are being made. Meantime work in the virgin ground goes ahead steadily.

Ollie Reed.—Considerable work is being done while the property is shipping rich gold ore, which is returning good royalties to the owners as well as profits to the lessees.

Rhodesia Mining Co.—Some new ground has been opened up and ore is being taken out from the recent finds, but owing to bad roads shipments are not frequent.

SAN MIGUEL COUNTY.

(*From Our Special Correspondent.*)

The industrial situation in this county is gradually improving. Martial law is still in force, but is maintained principally for the purpose of preventing the deported miners from returning and creating trouble, and to suppress any uprising that may be attempted. There are only 25 to 30 soldiers on duty under command of Capt. Bulkeley Wells. The three big mining companies most seriously affected by the strike, to wit, the Smuggler-Union, Tomboy and Liberty Bell, have as yet been unable to secure a full force of experienced miners, and their mills, in consequence, have not been running full capacity. From 10 to 30 practical miners are coming in every week, however, and the managers are of opinion that it will not be long until they will have a full force.

Alta Mines Co.—The Alta mill, in Gold King basin, comprising 20 stamps and a Huntington, with a maximum capacity of 100 tons in 24 hours, is running full capacity and turning out about two carloads of concentrates daily. In addition to the milling ore, the vein carries a large streak which yields from $60 to $80 per ton in gold, silver and lead, and this grade is shipped in its crude state direct to smelters. There is not a full force of miners employed, owing to a strike. A. C. Koch, of Telluride, is resident manager of the company.

Butterfly-Terrible Gold Mining Co.—This company's mines and 30-stamp mill, at Ophir Loop, are running full capacity. The mill is supplied with mineral from stoping ground 700 to 800 ft. long and 320 ft. high between No. 1 and No. 3 levels. The vein carries from 3 to 8 ft. of ore, which runs from $10 to $25 to the ton. It is largely free milling, and 90% of the values are saved on the mill plants by amalgamation. J. F. Keating, of Ames, is resident manager of the property.

Gold King Consolidated Mining Co.—A portion of this company's 40-stamp mill, in Gold King basin, will be put in operation within the next few days, treating lessees ore from the Gold King mine. During the winter lessees have been at work and have taken out a considerable quantity of medium grade free milling gold ore. Maj. Cooper Anderson, of Telluride, is resident manager of the property.

SUMMIT COUNTY.

American Gold Dredging Co.—The Bucyrus dredge of this company is at work near Breckenridge and is expected to continue day and night until November. The placers, which are operated by this company, with hydraulic giants and sluices, in Gold Run and Galena gulches, will be started up as soon as the water can be had through the 11 miles of ditches and numerous flumes. These ditches were shoveled out last autumn and the flumes rebuilt or put in good condition, and there will be more water available than last season. W. W. Dyar is manager.

Gold Pan.—The big placer mining pit of this company at Breckenridge, is unwatered and the two 20-ton dirigible locomotive cranes put in working order. A structure has just been completed over the top of the first section of the 30-in. belt conveyor.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Cripple Creek & Colorado Gold Mining Co.—A strike has been made on the Rittenhouse group of this company. This is good news, as heretofore no ore has been found on the property. At present it is being worked by lessees. A large amount of work has been done by the company. The property is on Gold hill, and Marion Stark, of Cripple Creek, is in charge.

Cripple Creek Enterprise.—It is rumored that this property is to resume operations and that there has been a change of the controlling interest. The company has a long lease from the city of Cripple Creek on all the ore under the streets and alleys. Besides this, the company owns a number of lots. Considerable work has been done, but so far no ore has been found. The property has been idle for several months. Mr. Dan Hanley, of Cripple Creek, is in charge of the property.

El Paso Consolidated.—This property, on Beacon hill, is one of the largest in the district. While the tonnage produced is not very great, the average value of the ore is probably greater than in any other of the large mines of the district. The completion of the drainage tunnel some months ago materially assisted the property. A dividend of 1c. per share was declared this week, making a sum of nearly $25,000 to be distributed among the stockholders.

Golden Cycle.—A special meeting of the stockholders will be held in a short time, to decide whether there will be a consolidation with the Theresa Co. or whether the Golden Cycle will buy the Theresa property. At present the two companies are in litigation over the apex of certain veins. It is understood that some of the stockholders are opposed to a settlement.

Golden Wedge.—This mine has passed out of the hands of the Mary Jane Co., on account of the failure of the company to redeem the property which was sold some time ago. It is now in the hands of a Mr. Stanley, of Denver. The ground is being worked by a number of lessees, among others being Joe Winchester, who made

a fortune out of the Doctor mine in the same vicinity. The property is situated on Raven hill.

GEORGIA.

LUMPKIN COUNTY.

Dahlonega Gold Mining & Milling Co.—At the annual meeting in Dahlonega, May 12, the following directors were chosen: Thomas R. Cravens, Robert S. Disney, S. P. Shope, Chicago, Ill.; Willard I. Rush, Kansas City, Mo.; Joel T. Miller, Auraria, Ga. The board elected Robert S. Disney, vice-president; S. P. Shope, secretary, treasurer and managing director; Joel T. Miller, assistant treasurer; W. S. Huff, assistant secretary and attorney, with office in Dahlonega. It was resolved to complete the canal from Ball Play creek and to build a large dredge for use on the Chestatee river, in the neighborhood of the company's Briar Patch property.

IDAHO.

ELMORE COUNTY.

(From Our Special Correspondent.)

Franklin.—This mine is in the Pine district, 45 miles north of Mountainhome, on the south fork of the Boise river. It belongs to R. P. Chattin, E. C. Towne and others, of Mountainhome, but is now under bond to Larson & Greenough. The bond expires July 1, 1904. It is generally believed the bond will be taken up at that date. The main vein averages about 3.5 ft. wide, running $25 to $40 per ton in gold-bearing quartz, accompanied by iron sulphides. The mine is opened by two crosscuts. A third crosscut, 205 ft. below the second, is in 400 ft. Drifting on the vein from No. 2 crosscut amounts to 550 ft. The ore mined and milled by Larson & Greenough for several months has been netting from $7,000 to $10,000 per month in bullion recovered on the amalgamating plates, besides a considerable tonnage of concentrates running from $75 to $100 per ton. Roy H. Clarke is superintendent.

SHOSHONE COUNTY.

Oreano Mining Co.—This company, near Burke, is laying 6,000 ft. of 2-in. pipe from the compressor of the Anchor Mining Co., to supply air for drills to be used in driving the tunnel in the Oreano property. The tunnel is in 400 ft., and must be driven 1,000 ft. farther before the first ledge is cut. Carl Amonson is the manager.

WASHINGTON COUNTY.

(From Our Special Correspondent.)

Heath Mining Co.—This company's group is in Heath district, 18 miles west of Cambridge. A 500-ft. cross-cut has opened a low grade copper-iron sulphide. Frank Fairbairn, of Erie, Pa., is manager, with O. C. Holland in charge of the work.

Iron Springs.—This property is being developed under the management of C. F. Macey, at Iron Springs, near Black Lake. A vertical 3-compartment shaft, down 200 ft., is being sunk on a ledge of iron sulphides that carry gold values. A steam plant for hoisting and other work is in operation. D. A. Utter, of Weiser, is consulting engineer for the company.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Baltic.—A Huntington centrifugal mill for re-grinding middlings and raggings has been purchased from the Allis-Chalmers Co., of Chicago, and installed at the stamp mill. It treats 60 tons per day.

Calumet & Hecla.—The April production of this mine is estimated at 3,200 tons of refined copper. President Alexander Agassiz, consulting engineer E. D. Leavitt and Rudolph Agassiz are at the mine for their regular spring inspection.

Centennial.—The machinery in the old stamp mill at the mine on the Calumet conglomerate lode has been sold.

Champion.—A Gates gyratory rock crusher has been installed in the rockhouse at D shaft.

Isle Royale.—The April production of this mine is estimated at 87.5 tons of refined copper.

Michigan Smelting Co.—Fires have been kindled in two furnaces and will be maintained three weeks to dry them. The first charge of mineral will be fired June 1, one melting and one casting furnace going in blast.

Osceola Consolidated.—The April output of this mine was 900 tons of refined copper. The rock shipments average 3,700 tons daily, averaging 20 lbs. of refined copper to the ton.

Tamarack.—The April production of this mine was 527.5 tons of refined copper, it is estimated. No. 1 shaft is shipping 5,000 tons of rock per month. A brick-lined steel stack, 90 ft. high and 8 ft. in diameter, has been erected at No. 3 shaft. Alexander Craig has been appointed assistant master mechanic.

Trimountain.—A force of 25 men is erecting a dry house near No. 2 shaft to replace the one recently burned. The main structure will be 116 by 30 ft., wash room 30 by 30 ft. and north wing 39 by 20 ft. It will be completed in two months. R. H. Oliver has been appointed mining engineer.

COPPER—KEWEENAW COUNTY.

Allouez Mining Co.—Notice is given that an assessment of $3 per share has been levied on the capital stock of this company, under date of May 12. This assessment will be payable in installments, $1.50 on May 26, by the stockholders of record on May 25; and $1.50 on September 26 by stockholders of record September 24. The assessment is levied to provide funds for the continued sinking of No. 1 Kearsarge shaft, for the further development of the mine by construction and equipment.

(From Our Special Correspondent.)

Miskwabik Development Association.—This concern will resume active mining operations on its property north of the Mohawk mine in a few days. Additional machinery has been installed and the plant is now capable of handling the work planned.

Phoenix Consolidated.—Con Bedell has resigned as superintendent of the stamp mill. Capt. William A. Dunn, in charge of the mine, will look after the mill hereafter. About 125 men are employed.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Adventure Consolidated.—This mine produced 60 tons of refined copper in April. The stamp mill is operated during the day shift only.

Michigan.—This mine produced 147 tons of mineral in March. The head under lease in the Mass Consolidated mill at Keweenaw bay is supplied to its full capacity, 500 tons of rock daily, a large part of the shipments coming from the stockpiles at the mine. This rock is returning a fair average of copper.

IRON—GOGEBIC RANGE.

East Norrie.—This mine has suspended operations, throwing 500 men out. The mine has no more room for stock piles, and it is not known when it will resume operations, but will probably do so soon after navigation opens.

IRON—MENOMINEE RANGE.

Aragon.—The Oliver Mining Co. has laid off one shift at this mine at Norway, suspending work at No. 4 shaft. No. 2 continues in operation with 250 men, but it is reported that it also may be closed. Too much ore in stock, coupled with lack of stock-pile room, is given as the reason.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Cleveland Cliffs Iron Co.—This company has abandoned its Crosby mine, near Nushwauk, for this year, and has pulled the pumps. The mine is rather wet, and will rapidly fill with water. This is the only property on the Mesabi that this company has as yet commenced opening.

Corrigan, McKinney & Co.—This firm, last week, let contracts to the Drake & Stratton Co. for additional stripping at the Stevenson mine to the amount of 500,000 yards, making 700,000 to be moved this year. This will probably complete all stripping to be done at the Stevenson, and is for the north side of the pit, in section 8, which passed into the mining company's hands not long ago. It is scarcely probable that the Stevenson will ever be a larger shipper than it has been.

Higgins.—Preparations are being made for extensive shipments from the Higgins, of the Oliver Iron Mining Co., and stripping is under way day and night with one shovel. The Duluth, Missabe & Northern road has completed its tracks to the mine and a hoisting equipment capable of large production is being installed in the shaft.

International Harvester Co.—This company is stripping at its Agnew mine, on company account, and at its Hawkins by McArthur Bros., contractors. According to appearances both mines will make a fairly good shipment this year.

Mahoning.—This mine will be shipping to docks in a few days. It opens on a schedule of 700,000 tons for the season, which may be increased later in the year, if occasion warrants. Not long ago there were 585,000 tons of Mahoning ore on Lake Erie docks, more than half the mine's 1903 production, and unless this goes forward faster than it has been moving, the 700,000 tons will be the limit for the season. The company will carry forward some stripping during the year.

Sellwood Leases.—The exact status of the Pearce and Longyear mines, both of which were given up by Jos. Sellwood not long ago, is yet undecided. Mr. Sellwood had them under subleases; in fact, there were three leases ahead of him in the Pearce, and who is to hold them has not been determined. They are both non-bessemer mines. The Longyear is quite wet, and the Pearce is not a large deposit, so that they cannot be economically mined this year.

Susquehanna.—This mine, owned by the Buffalo & Susquehanna Iron Co., of Buffalo, N. Y., has been closed indefinitely, and the company will make no attempt to produce anything this year. Two shafts have been sunk and some little development has been done in the ore body. This mine adjoins the main part of the city of Hibbing. Its ore body lies under about 140 ft. of surface, but the management is figuring on stripping the property at some later date.

MISSOURI.

JASPER COUNTY.

Monticello.—A new 150-ton mill has been completed near Webb City by S. E. Carter, Claud Ball, Thos. Sawyer, J. B. Amsden and J. E. Madarie, who have nine lots on the Croesus lease adjoining the Lucky Budge mine and have a shaft down 190 ft. and a 30 ft. face of ore. The mill is equipped with two 80 h. p. boilers, a 75 h. p. engine, a 4-drill air compressor, self-feeding ore hopper, etc. Al Maness is superintendent and manager.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Disloge Lead Co.—This company has completed the addition to its concentration mill, which brings it up to 1,000 tons daily capacity. A 400-h. p. water-tube boiler has been added to the No. 3 shaft plant.

St. Joe.—The roasting plant at Herculaneum has been increased to 18 furnaces, which has permitted the shutting of all but four of the old roasting furnaces at Bonne Terre.

MONTANA.

JEFFERSON COUNTY.

Rose.—Jensen & Co., of Norwich, Conn., have secured a controlling interest in these gold mines, at the head of Golconda creek, and, it is reported, they will erect a mill to treat the product of this and other mines taken over. There is said to be a 95 ft. vein of good ore in the Yellow Jacket.

LEWIS & CLARKE COUNTY.

Amador.—This copper mine, on Cedar creek, 12 miles from Helena, is being rapidly developed. The company has spent $140,000 and contemplates a further outlay. The machinery is run by water power. The company is also building a flume 2.25 miles long to develop water power for the smelter, which is to be built at Iron Mountain station. A townsite is being

laid out. An electric tram will be built this season connecting the mine and railroad station.

Gloster.—M. Edwards is putting in a cyanide plant at this mine, near Marysville. There are thousands of tons on the dumps, which, it is stated, will average more than $5 a ton, permitting a good profit.

MADISON COUNTY.

Montana-Revenue Mining Co.—Ground has been broken for the new 100-ton cyanide mill of this company six miles from Norris, and it is expected to be in operation by August 1. The mill will be a dry crusher and have a cyanide attachment. The old mill has been out of commission for three years, and is being torn down. The mine has been in operation right along, and considerable high grade gold rock has been taken from its levels and shipped. It has a shaft 300 ft. deep and numerous levels and crosscuts. All of the milling, or second-class ore, has been saved, and there is now on the dump about 15,000 tons, which will be run through the new mill. A four-mile water pipe line is being laid. Roger Knox is manager of the property.

MISSOULA COUNTY.

Duquesne Mining Co.—Anton Lutey, of Alleghany, Pa., has brought suit against this company in the District Court at Missoula. The plaintiff alleges that the company executed certain promissory notes in his favor which are past due and have not been paid. The mining property belonging to the company is situated west of Missoula, and near DeBorgia. Mr. Lutey is president of the company and H. L. Scott is secretary.

PENNSYLVANIA.

BITUMINOUS COAL.

Pennsylvania Coal & Coke Co.—An official announcement is reported made that this company has purchased all the capital stock and franchises of the Beech Creek Coal & Coke Co., and now controls more than 117,000 acres of coal and surface land, chiefly in Blair, Cambria, Clearfield and Indiana counties, upon which are located 44 operating collieries with a daily shipping capacity of 25,000 tons. The company owns also about 2,000 coke ovens, with a daily capacity of 2,000 tons. The board of directors of the Pennsylvania Coal & Coke Co., it is reported, will be as follows: President, W. A. Lathrop, formerly general superintendent of the Lehigh Valley Coal Co.; vice-presidents, T. H. Watkins and C. D. Simpson, of Scranton; R. H. Williams and S. T. Peters, of New York; H. G. Lloyd, of Philadelphia; Robert Mitchell, Philadelphia; James Kerr, president of the Beech Creek Coal & Coke Co., and A. E. Patton. James Kerr will continue as president of the Beech Creek Company.

UTAH.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Ore Shipments.—During the week ending May 14, shipments aggregated 134 car loads as follows: Ajax, 4; Bullion-Beck, 1; Carisa, 6; Centennial-Eureka, 60; Grand Central, 20; Gemini, 17; Lower Mammoth, 3; Mammoth, 11; South Swansea, 1; Uncle Sam Con., 1; Victor Con., 2; Yankee Con., 5; Uncle Sam Con. (concentrates), 3.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated.—Shipments of copper bullion from this plant during the week ending May 14 aggregated 241,086 lb.

United States.—During the week ending May 14 the shipments of copper bullion from this plant aggregated 248,209 lb.

Utah Consolidated.—Copper bullion shipments from this plant during the week ending May 14 aggregated 309,510 lb.

Utah Copper Co.—This company's Bingham mill is now reducing to concentrates 600 tons of ore daily and turning out a product that assays from 35 to 40% copper, from $7 to $9 in gold and some silver.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—During last week shipments aggregated 5,258,320 lb. From the Daly-West, 2,794,000; Silver King, 1,749,320; Ontario, 680,000; Creole, 35,000.

TOOELE COUNTY.

(From Our Special Correspondent.)

Black Diamond.—This company, operating at Stockton, will move its general headquarters to Salt Lake City shortly, with W. C. Alexander, secretary and treasurer, in charge. Beginning June 1 the company will commence the delivery of milling ores to the Honerine mill at Buhl for treatment.

FOREIGN MINING NEWS.

AUSTRALIA.

QUEENSLAND.

The Mines Department reports that the yield from the Queensland gold mines in March was 55,686 oz. fine gold, an increase of 22 oz. over March, 1904. For the three months ending March 31, the total was 145,027 oz. fine gold, which compares with 148,412 oz. for the first quarter of 1903, showing a decrease of 3,385 oz. this year. The dividends reported by Queensland mines in the first quarter of the year were £212,406 in all.

WESTERN AUSTRALIA.

The total output of gold in April is reported at 216,574 oz. bullion, which is 2,845 oz. more than in March. For the four months ending April 30, the total was 785,987 oz. bullion, against 806,199 oz. for the corresponding period in 1903, showing a decrease of 10,202 oz. this year. The bullion reported this year was equal to 656,971 oz. fine gold, or $13,579,587 in value.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending May 7 shipments amounted to 13,240 tons, as follows: Granby, 10,260; Mother Lode, 2,560; Emma, 390; Oro Denoro, 30; total for the year to date, 285,614 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending May 7 shipments aggregated 3,290 tons, as follows: Central Star, 1,440; War Eagle, 810; Le Roi No. 2, 530; same mine, milled, 350; Spitzee, 60; I. X. L., milled, 100; total for the year to date, 141,073 tons.

SOUTH AMERICA.

BRITISH GUIANA.

Exports of gold from the colony for the four months ending April 30 were $391,100, against $446,133 in the corresponding period in 1902, a decrease of $55,033 this year.

Exports of diamonds for the four months were 3,004 carats, valued at $23,793, against 2,121 carats, valued at $17,043, last year.

MINING STOCKS.

(Full quotations given on pages 828 and 829.)

NEW YORK, May 18.

The topic of discussion this week has been the depreciation in United States Steel common shares, which made a new low record at $8.375 on May 13. This price put the gross market value of $550,000,000 common stock at only $46,062,500, or considerably less than has been paid in dividends on it. Simultaneously, there was some weakness in the preferred issue, aggravated by the belief that the 7 per cent. annual dividend would be cut 2 or 3 per cent. The low price was $51.25, placing the market value of the $360,281,100 issue at $184,644,064, or at a discount of nearly 50 per cent. In other words, the $910,281,100 share capital stood on May 13 at $230,706,564 in the open market, which is surprising considering that $158,848,875 has been distributed as dividends.

Amalgamated copper went down to $48⅞, and encouraged trading. Anaconda showed better form at $19.50. Greene Consolidated of Mexico held around $15, and White Knob, of Idaho, moved at $7@$7.50.

Quiet reigned in the gold and silver list. Standard Consolidated, of California, reappeared at $2.35. Elkton Consolidated, of Cripple Creek, Colo., stood at 67c., and Isabella at 33c. The Comstock stocks are again levying assessments, and as a result prices are weaker. Ophir eased off to $5, Consolidated California & Virginia to $1.65, and Occidental to $1.80.

Standard Oil has cut its second quarterly dividend in half, declaring $8, payable June 15. A year ago $7 was paid. Sales of the stock this week were made at $625, just 20 points less than at the time when the last quarterly dividend was announced, in February.

At the close the industrial market, led by United States Steel, is fractionally higher, but trading is limited.

Boston. May 17.

(From Our Special Correspondent.)

Mining shares in this market are all slow and show hardly more than fractional changes during the week. There has been more or less accumulation of specialties, however. The spurt recorded in Amalgamated late last week was hardly reflected in the balance of the other share list, although this stock has made a net gain of $1.50. It is considered significant at this center that so many Amalgamated officials, as well as Heinze and MacGinnis, should be in New York at one time. There are indefinite rumors, also, that the next dividend will be increased.

Although the market is slow, some of the standard stocks show slight improvement, such as Parrot which is up $1.25 to $24.50 on early dividend prospects. Mohawk, on the other hand, has gone off over $2 to $39.62½. There is no special significance in the latter case, as the trading has been light.

The only real piece of news is the levying of a $3 assessment on Allouez mining stock, payable in two instalments of $1.50 each, May 26 and September 26. This will provide funds for the further development of the mine. The stock has lost $1 to $4.

Daly West has been firm, closing $1 above a week back, at $23.50. A slight accident at the property had no effect on the stock. Much of the recent demand for Daly West stock has come from Salt Lake people who liquidated their stock on anticipation of a reduction of the dividend.

Copper Range made a $2 advance to $44, but has lost all but a small fraction. Montana Coal & Coke made a spurt from $2.87½ to $4.37½ on the improved prospects of the company. Utah has fluctuated between $33.25 and 33.87½. The next dividend in July is expected to be the regular $1.50, but in the fall the possibilities are that the rate will be increased to $2 for the half-year. Calumet & Hecla has lost $7 to $450. Tamarack sold at $90@$93 and Wolverine at $71@$70. Osceola is quiet around $56.75 and Centennial close to $20. Boston Consolidated is steady around $6, on the curb.

Colorado Springs. May 13.

(From Our Special Correspondent.)

The market in Cripple Creek shares at the close of the current week is in unsatisfactory condition, and indications point to the fact that lower prices will prevail. The volume of trading has been but fair. Some of the leaders have shown some strength; among them were C. K. & N., which sold up to 30, and Portland, at $1.72½. El Paso was a heavy trader, but at a stationary quotation of 85. A strike of considerable importance is reported in the lower levels of the El Paso, but as yet this report lacks confirmation.

Work on the extension of the drainage tunnel was stopped this week, on account of the exhaustion of the funds subscribed for this purpose. However, the tunnel has done and will continue to do good work in the camp, as the water level has receded some 55 ft. since its completion, and is still receding.

Salt Lake City. May 14.

(From Our Special Correspondent.)

Little of interest happened on the Mining Exchange during the week. Stocks are still at a low level, with nothing to indicate a radical change for the better in the near future. The action taken by the board of directors of the Daly West Co. in reducing the dividend from 65 to 40c. a share has settled the uncertainty, as far as that stock is concerned. It became apparent to the management several months ago

that to continue to draw so heavily upon the high grade ore reserves would be disastrous. In the meantime plans have gone ahead to increase the milling facilities of the property. Manager Bamberger has made the statement that with the dividend 40c. and the bulk of the revenues coming from the milling ores, the life of the mine is prolonged and insures reasonable dividends for an indefinite number of years. The directors ordered the payment of $72,000 for May. The mine has paid $117,000 since last September. The large 2,000-ton ore-bin at the mill, recently completed, collapsed on May 12, incurring a loss of about $2,000. As a result, the mill was obliged to close down several days.

The Grand Central of Tintic continues to market large tonnages of ore. The directors have posted the usual monthly dividend of $25,000 again. The stock maintains a steady price; but little is being offered. The Utah mine of Fish Springs has posted another dividend of $1,000. No stock was sold during the week. Tetro and Yankee Consolidated have both been inactive and weaker. Only 200 shares of Century were sold.

San Francisco. May 12.

(From Our Special Correspondent.)

The Comstock shares have been rather dull and quiet on comparatively small trading. Changes in price, however, were not specially marked. Some quotations noted are: Ophir, $5.50; Mexican, $2; Best & Belcher, $1.65; Consolidated California & Virginia, $1.55@$1.60; Sierra Nevada, 51c.; Gould & Curry, 32c.; Yellow Jacket, 22c.; Potosi, 18c.

The sworn statements of the mining companies, as filed in their offices this week, show cash on hand May 1 as follows, with all expenses paid, unless otherwise noted: Alta, $154, with liabilities of $4.501; Andes, $689; Alpha Consolidated, $1,880; Best & Belcher, $250, with $3,500 due bank; Bullion, $1,888; Caledonia, $60, with $1,409 due treasurer and April expenses unpaid; Chollar, $4,676; Consolidated New York, $1,271; Confidence, $3,333, with April expenses unpaid; Consolidated California & Virginia, $214, with concentrates unsold and $15,000 due bank; Exchequer, $2,347; Gould & Curry, $405, with bills receivable of $780; Hale & Norcross, $264, with $1,500 due bank; Julia Consolidated, $1,961; Justice, $5,391; Mexican, $716; Ophir, $74,797, with 14 car-loads of ore unsold; Overman, $5,721, with $308 due on last assessment and April expenses unpaid; Potosi, $4.092; Savage, $2.071; Segregated Belcher, $1,851; Scorpion, $188, with indebtedness of $6,180; Sierra Nevada, $1,386; Silver Hill, $7,300, with clean-up of bullion to come; Standard Consolidated, $97,187, with April clean-up and April expenses to be accounted for; Syndicate, $2,642; Union Consolidated, $9,157; Utah Consolidated, $50, with $2,000 due on note and April expenses partly unpaid.

The following companies in the above list now have assessments declared or under collection: Alpha Consolidated, Best & Belcher, Caledonia, Confidence, Consolidated California & Virginia, Gould & Curry, Hale & Norcross, Justice, Mexican, Sierra Nevada, Union Consolidated and Utah Consolidated.

On the San Francisco & Tonapah exchange business was only fair, but prices were quite steady. There was a little more trading for outside account. Montana Tonopah brought $1.65; Tonopah Belmont, 72c.; Tonopah Midway, 40c.; McNamara, 19c. per share. The heaviest trading for the week was in Midway.

On the California exchange the market for oil stocks was fairly steady, though one or two leading stocks weakened a little. Home sold at $1.60; Oil City, 47c.; Independence, 28c.; Petroleum Center, 5c. a share. The heaviest trading was in the low-priced stocks.

Monterey. May 7.

(From Our Special Correspondent.)

Exchange on New York has dropped from 224.5 to 222.5.

Mining stocks have sold as follows: El Oro district: Victoria, $45; Aldebaran, $45; Aurora, $9; Nacional, $24; Luz de Borda, $52; San Ignacio, $6.50; La Union, $45; Ocotes, $7; of Pachuca, San Francisco, $82; San Rafael, $17.05; Reina, $14, and Barreno, San Luis Potosi, $69; and La Paz, Matchuala, $185.

COAL TRADE REVIEW.

New York, May 18.

ANTHRACITE.

Conditions in the anthracite trade are good, and there is every prospect that activity will continue during the next few months. At the seaboard, and especially in New England, buyers are taking advantage of the discount, and orders are being very liberally placed. Production will be decreased a little this month by holidays. Already there have been one or two church and local holidays, and Decoration Day comes in towards the end of the month. The only drawback is the delay in opening the lake trade. Shipments westward are practically stopped, owing to the congestion at Buffalo, where it is impossible to unload or move cars, and no more coal can be received until some cargoes have been shipped. The present outlook is that there will be no considerable movement on the lakes before June.

This has caused a shortage of coal in Chicago territory. Orders are being taken to be delivered when possible. At the upper lake ports docks are bare, and there is an urgent demand for shipments of coal. If the demand was for immediate delivery, it is quite probable that a premium would be asked; but as most of the coal is for future deliveries, orders being placed now to secure the discount, there is not much opportunity for local dealers to make an increase.

A better demand is reported for steam sizes of coal in the East, especially in New England territory, and there seems to be an opportunity to recover the ground lost in competition with bituminous.

Tidewater prices are steady at the 40c. discount allowed this month; for steam sizes also prices are steady.

BITUMINOUS.

Trade at the Atlantic seaboard continues dull, and more coal is being offered than the market can take care of. Consequently current prices have been lowered, and Clearfield grades of coal are obtainable at $2.25@$2.45 per ton, f. o. b. New York harbor. Producers in certain districts are understood to be curtailing their shipments, while in other sections they are oversold, and are unable to meet the demand. As a result vessel owners who are loading and discharging on the limited day clause are kicking. This clause is looked upon by the trade generally as being still unsatisfactory. True, there is a reason for finding fault in loading coal, especially at Norfolk and Newport News, and the system here is open to correction, but it appears that boat owners have gone to the other extreme. However, there is hope that the situation will be adjusted later.

There is considerable coal at tidewater. Trade in the far East is taking much coal from the Virginia capes, but a relaxation may be expected, as stocks are fast accumulating. Consumers do not seem to be using up their supplies as quickly as they have heretofore.

Trade along the Sound is very quiet. The attention of coal users in this territory is concentrated on anthracite. At New York harbor business is dull.

All-rail trade is slow, and the quantity of coal moving forward shows a falling off. Transportation from mines to tide is excellent. Car supply is limited by the dispatch given to unloading at tide. In the coastwise market, vessels are inclined to be a little scarce, especially those of the lighter draft class, and rates are firm. We quote from Philadelphia: To Boston, Salem and Portland, 90c.; the Sound, 70c.; Lynn and Gardiner, $1 and towage to the latter port; Newburyport, $1.05; Portsmouth, 95c.; Bath, 95c.; Saco, $1.10@$1.15 and towage; Bangor, $1.10; Gloucester, $1.

Birmingham. May 16.

(From Our Special Correspondent.)

Notwithstanding the coal production in Alabama is still brisk, there is some complaint to be heard as to the market conditions. Quotations are not as strong as they were three or four months ago. The consumption of coal in the immediate district is still quite large and much coal is required to meet these demands. Only one of the rolling mills in the Birmingham district is in full operation, hence the demands from that source are not so active. Other interests are lagging a little, all tending to affect the coal industry.

The new mines recently established in Jefferson and Bibb counties, are getting down to hard work, and already are producing a large amount of coal. The mines at Blocton have lost nearly two weeks' time on account of trouble with labor growing out of the killing of a miner, named Hartsook, by another, named Watson. The superintendent of the mines in some manner made recommendations to the miners in reference to the killing which brought on discussion, and there has been a suspension of work at that place.

The Galloway Coal Co., the largest coal producing company in Walker county, has filed its bill in a suit against the Central Railroad of Georgia, alleging a debt for coal and a breach of contract made last year, a sum approaching $42,000 being claimed. The coal corporation claims to have made a contract with the Central Railway of Georgia for 500 tons of coal daily at $1.40 per ton. The coal was delivered in quantities desired by the railroad company. The contract was to have continued until May 1, 1904. In March, however, the railroad company, it is charged, ceased taking coal.

Chicago. May 16.

(From Our Special Correspondent.)

Bituminous coal throughout the West is on a lower basis than at any time in a number of years. The production in Illinois and Indiana is about one-third the normal quantity at present, and dealers are urging producers to keep the output down to this point for the next few weeks, hoping to encourage a little recovery in the market.

Precisely the opposite condition prevails in the anthracite field. Western dealers and shipping agents are using all their resources to get into the Chicago market sufficient hard coal to meet their orders, with poor success. Nothing but rail coal is coming in, and very little of that. Up to May 1 last year, Chicago had received upwards of 100,000 tons by lake, while this year, none has come in by water. There has also been a shortage of 125,000 tons of rail coal for the months of January, February, March and April, the combination of rail and lake shortage making the Chicago market short 225,000 tons, as compared with last year. Circular prices are being strictly maintained.

Cleveland. May 17.

(From Our Special Correspondent.)

The coke situation in this territory is proving to be interesting. The railroads have squared around from the recent entanglement, and are now able to take care of the trade. The movement is, in fact, so free that it is embarrassing. Prices have been weak under the stress recently laid upon the market but they have not broken. The market is still scraping along the bottom, with no tendency to advance. Good 72-hour foundry coke is bringing $2.25@$2.50 at the furnace, with high sulphur cokes ranging about $2 at the oven.

The lake coal situation has not changed. The lumber fleet has started operations for the year. These boats, which usually have been running back to the head of the lakes light, are now taking coal cargoes because they have not enough to do in their own trade. They are therefore taking up the first cargoes of coal to relieve the northwestern situation. The embargoes against the movement of coal from Pittsburg territory have not been removed. The strike is still on in Ohio district No. 8 and the coal output is therefore being curtailed to a certain extent. The market is a little dull at the present time, the prices being about $1 for steam coal at the mines, either Pittsburg or Ohio veins. The domestic demand is, of course, very light at the present time.

Pittsburg. May 17.

(From Our Special Correspondent.)

Coal.—The strike of 10,000 miners in the Eighth district of Ohio has had an effect on the coal trade in the Pittsburg district. More mines are in operation this week and prices are

firmer than at any time since the new wage scale went into effect on April 1. A leading producer declared to-day that it would be impossible to place a contract now at less than $1.10 for run-of-mine coal. When shipments to the lakes are resumed he predicts that all the mines in this district will be in full operation. The river trade is better than it has been for many years, owing to the navigable condition of the rivers. There is but little coal loaded in the pools and harbor, the recent heavy shipments to the southern markets having taken away all the loaded boats and barges. Empties were returned on each trip of the tow-boats and there are now enough here to keep the mines along the river in steady operation for some time.

Connellsville Coke.—Both production and shipments have declined, and prices are lower. Furnace coke is quoted this week at $1.45@$1.55 and foundry coke ranges from $1.90 to $2. The production in the Connellsville region for the week was 227,968 tons, a decrease of 2,873 tons compared with the previous week. The shipments for the week amounted to 9,935 cars, distributed as follows: To Pittsburg and river points, 3,585 cars; to points west of Pittsburg, 4,755 cars; to points east of Everson, 1,595 cars. This was a decrease of 615 cars compared with the shipments of the preceding week.

San Francisco. May 12.

(*From Our Special Correspondent.*)

The local coal market is steady, with no changes in price. Fuel oil continues in good demand.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel and $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. May 18.

Nothing new can be noted locally, either in exports or imports.

The production of coal in Germany for the three months ending March 31 is reported as below, in metric tons:

	1903.	1904.	Changes.
Coal	9,489,749	10,639,803	I. 1,150,054
Brown coal	3,581,413	4,263,505	I. 682,092
Total mined	13,071,162	14,903,308	I. 1,832,146
Coke made	935,021	1,034,130	I. 99,109
Briquettes made	787,966	972,551	I. 184,585

Of the coal mined this year, 9,952,992 tons, and of the brown coal, 3,614,175 tons were from the mines in Prussia. The briquettes were made chiefly from brown coal.

Imports of coal into Turkey for the year are reported by the British Consul at Constantinople as follows, in long tons:

	1902.	1903.	Changes.
British	236,476	289,982	I. 44,506
Russian	.....	5,590	I. 5,590
American	.....	554	I. 554
Total	236,476	287,126	I. 50,650

The total output of the Turkish mines at Heraklea last year was about 300,000 tons. About one-fifth of this was disposed of in bunkering Turkish and other vessels trading in the Black sea at the company's port at Zoungouldak. About 70,000 tons were shipped to Smyrna, Salonica, Beyrout, Piræus and Trieste.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of May 7, that the market is weak, and owing to the small demand for business, it is likely to continue so. There is no demand for coal in the Far East. Quotations are: Best Welsh steam coal, $4.26; seconds, $4.08; thirds, $3.96; dry, $3.96; best Monmouthshire, $3.60; seconds, $3.42; best small steam coal, $1.98; seconds, $1.80; other sorts, $1.62.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market to the Mediterranean is easy, other directions steadying. Some rates quoted from Cardiff are: Marseilles, $1.50; Genoa, $1.50; Naples, $1.50; Las Palmas, $1.50; St. Vincent, $1.68; Rio, $2.16; Santos, $2.64; Buenos Aires, $2.04.

IRON TRADE REVIEW.

New York, May 18.

The iron markets during the week have been extremely dull. New business is scarce, and buyers are evidently holding back again, expecting substantial reductions. Of course, the furnace and millmen claim that they cannot respond to this demand without losing money—about which there may be two opinions. The pig iron market has been demoralized by the break in Southern iron. The Alabama furnacemen have accepted the situation, and No. 2 foundry is now selling at $9.50, Birmingham, orders for delivery after June being accepted at that price. Most of the furnaces are pretty well sold up to the end of next month. Steel billets are reported to have been sold at a cut of from $1 to $1.50 per ton, seaboard delivery, under the Association price.

In finished material the story is the same. Nothing is doing, except business for immediate delivery. Buyers are not disposed to contract for any third-quarter business, unless they can get a reduction, and sellers, of course, are not willing to grant that if they can help it.

The ore situation continues rather mixed. Shipment down the lakes has not yet begun, although it would be possible to get vessels there. The strike of the masters and pilots is delaying the sending out of ore boats.

The German Steel Syndicate has decided to reduce the bounty allowed to its members on finished steel exported. The present bounty is 15 marks, or $3.57 per ton; after July 1 the bounty will be 12-50 marks, or $2.98 per ton.

Pig Iron Production.—The production of pig iron again shows an increase this month, the number of coke and anthracite furnaces reported in blast being 230, having an aggregate weekly capacity of 367,400 tons, against 220 furnaces and 337,300 tons at the beginning of April. The increase in production is largely in the furnaces operated by the big steel companies. The *Iron Age* estimates the production for April at 1,455,400 tons, making a total of 5,127,500 tons for the four months ending April 30. These estimates, as we have heretofore remarked, are usually rather conservative. The production of speigeleisen and ferro-manganese in April was 29,145 tons, showing a large increase over any previous month of the present year. Unsold stocks of pig iron May 1 are reported at 444,000 tons, which is a decrease of 14,000 tons, as compared with April 1, and of 154,000 tons, as compared with January 1. These stocks do not include material held by the steel companies for their own use.

Birmingham. May 16.

(*From Our Special Correspondent.*)

The Southern pig iron market is weakening, and No. 2 foundry is now selling between $9.50 and $10 per ton, chiefly at the lower figure. Furnacemen, however, are not making much effort to sell, anticipating a change for the better. The Sloss-Sheffield Co. is again on the market, and is ready to sell iron for third-quarter delivery. Production keeps up well.

The report of the Southern Iron Committee for April shows that during that month the total movement of pig iron, cast-iron pipe, steel billets and steel rails was 182,625 tons, of which 104,127 tons were from the Birmingham district. These included 2,500 tons of steel rails, 1,800 tons of billets and 7,565 tons of cast-iron pipe. The shipments of cast-iron pipe from the Anniston and Chattanooga districts were 9,779 tons. There were 523 tons of cast-iron pipe exported.

Finished iron and steel business is quiet, and the Gate City mill of the Republic Iron & Steel Co. is the only rolling mill working on full time. The rolling mill at Bessemer has been delayed by some trouble with the men over the tonnage scale. Both steel plants at Ensley are busy, however.

The machine shop and foundry of the American Casting Co., recently built at East Birmingham, were destroyed by fire last week, causing a loss of about $25,000, partly covered by insurance. It is believed that the plant will be rebuilt.

Chicago. May 16.

(*From Our Special Correspondent.*)

There has been a further curtailment in the buying of pig iron during the past week, and a sluggish tone to the market. Most users had supplied present requirements, and future customers have been showing a disposition to hold off for a more favorable condition. Sales were made in small lots, mostly to malleable workers, foundrymen asking to have orders, already placed, held for later delivery. Prices quoted are: $9.75 at Birmingham and $13.50 at Chicago for No. 1 foundry, with a nominal price of $14. The lake tie-up is expected to have a vital influence on the iron market, as the furnace people will have to bring in stocks by rail or shut down, pending a settlement of the labor difficulties. The course of coke is also having an effect on iron, some extremely low prices having been made recently. New river coke has sold at forced sale in considerable quantities as low as 50c. at oven, and there has been a large amount of demurrage coke on western tracks, with no appreciable decrease in the supply.

Iron bars and structural material are being bought in fair quantities, the former for car construction and the latter for building purposes, mostly for Chicago consumption. Railroads are taking fair quantities for their shops. Sales of steel rails were 40,000 tons for delivery east of Chicago.

Cleveland. May 17.

(*From Our Special Correspondent.*)

Iron Ore.—The statement has been made by some of the iron ore experts of this territory that the amount of ore available for immediate use is 4,500,000 tons on Lake Erie ports and 6,000,000 tons in the furnace stock-piles. This has prevented anything like sales for the immediate future. The situation is also complicated by the lack of unity as to ore prices, consumers holding back until they get a line on the market. It is hardly possible that any ore sales will be made within the next 30 days. It is impossible to quote the market in a representative way. It is apparent, however, that the consumers want a very low price, as offered reduction of considerable amounts below recent schedules have not been taken. Nothing has been done in the way of making charters, either for spot cargoes or on contracts.

Pig Iron.—The pig iron market is a waiting one in every respect. July is coming very rapidly and practically no pig iron has been sold for delivery after that time. It looks as if some of the furnaces would have to sell material soon, or go out of blast. Upon the current buying of pig iron the prices hold at $13.25@13.50 in the Valley for No. 2 foundry. The bessemer and basic trades are dead.

Finished Material.—The market has not been as quiet for months as it is at the present time. Some current business is being done which is quite up to the extent of the buying of last year, the difference being that the competition has increased to such an extent that the market is weakened by the scramble of the producers to get the business. Bar iron is steady because prices are as low as the mills can afford to sell material, at the present cost of production. Prices are unchanged at 1.35c. Pittsburg as a basis. The sheet trade is spasmodic; prices hold steady on the old basis of 2.50c. Pittsburg for No. 27 black sheets out of stock. The structural trade does not pick up. Current small buying, however, is good, but no contracts are appearing. The same applies to the plate trade.

Old Material.—The market is extremely dull, and prices are nominal.

New York. May 18.

Pig Iron.—The local market has been quiet, so far as sales are concerned, consumers still buying only to meet immediate requirements. This policy is having its effect. The Southern furnaces have given way, and have apparently abandoned their adherence to the basis of $10 Birmingham, for No. 2 foundry, and prices are lower all around. Northern iron is lower, in consequence of the break in Southern. For Northern iron No. 1 is still maintained at $15.25@$15.50, but sales are very small. Other prices are lower as follows: No. 2 X foundry, $14.75@$15; No. 2 plain, $14.25@$14.50; gray forge, $13.75@$14. In Southern iron quotations on dock are: No. 1 foundry, $13.75; No. 2 foundry, $13.25; No. 3 foundry, $13; gray forge, $12.50; No. 1 soft, $13.75; No. 2 soft, $13.25.

Bar Iron and Steel.—The trade continues quiet. There is some pressure to sell soft steel bars, and it is said that concessions can be had on good orders. Refined bars are quoted at 1.495c., in large lots, with steel at the same figure. Common iron bars can be had for 1.35c.

Plates.—The market is still dull, with orders confined to small lots. Sheared plates are quoted as follows: Tank, 1.25-in. and heavier, 1.75@1.85c.; flange, 1.85@2c.; marine, 2@2.10c.

Structural Material.—The market remains dull, and only small orders are noted. Large lots at tide-water are still quoted at 1.75@2c. for beams, angles and channels.

Steel Rails.—Nothing is doing in standard rails, but there is some call for girder rails for electric roads. Quotations remain $28 for standard sections, f. o. b. mills. Light rails are quoted f. o. b. eastern Pennsylvania mills, as follows: 12-lb., $27; 20-lb., 25-lb., 30-lb., and 35-lb., $25; 40-lb. and 45-lb., $24.

Philadelphia. May 18.

(From Our Special Correspondent.)

Pig Iron.—Our pig iron brokers and agents are talking a little gloomily to-day over the more recent developments of the market. Their sales for the past six days are trifling. Their prospects of selling for the next week are not encouraging; they have sent out some agents to see what is the matter and find out directly from their customers how they stand. Buyers have got it into their heads somehow that pig iron is likely to weaken rather than strengthen. Then, most customers have all the iron they care to have at this time. There are two or three large consumers of basic pig in this territory who have a strong notion to buy and one of them has bought a good round lot but the other two or three are waiting. Some little charcoal iron has been brought in from the West and an order has just gone South for quite a lot of No. 3 and No. 4 foundry irons. No. 1 X foundry is quoted in most cases at about $15.50; No. 2 X, $15; No. 2 plain, $14.50. A good deal of Alabama No. 2 is being offered at $14.25 by rail. Standard forge is selling in retail lots to mills that are buying in a hand-to-mouth way at $13.50; basic is held at $14.

Billets.—Billets have been shaded $1.50 but the nominal asking price ranges all the way from $24 to $25.

Merchant Bar.—Very little bar has sold. A few small lots of steel bars sold at 1.55c. Carbuilders are snuffing around the market making inquiries for common iron, but no one thinks they mean business.

Sheets.—Sheets have begun to wobble and little is sold.

Boiler Tubes.—The work in shops using tubes is increasing, but the continuance of this activity is a matter of doubt. Tubes are quoted at the usual rates in small lots, but it is rumored that better discounts will soon be offered in car-load lots.

Merchant Pipe.—On certain kinds slight shadings are offered.

Merchant Steel.—Carriage spring steel has been selling well and tire steel is also under fair inquiry. Crucible steel is being worked up regularly and the entire merchant steel department is in healthy shape. Very little buying is done for forward delivery.

Plates.—There is nothing new, either as to quotations or sales.

Structural Material.—The movement in structural material is altogether unimportant.

Old Rails.—Old rails are quoted at $17@$17.50 for iron; no old steel rails are being offered.

Scrap.—The scrap market is dead. Dealers are, however, gathering up scrap, using the present condition of the market as an argument to buy stuff at their own prices.

Pittsburg. May 17.

(From Our Special Correspondent.)

The dullness in the iron and steel markets has not had any material effect on prices. Very little actual business was done in pig iron during the week, but inquiries have been much greater than for some time past. It was reported several days ago that the Consolidated Lake Superior Co. had placed contracts for 100,000 tons of bessemer pig iron with furnaces in the Valley and surrounding districts, but the report could not be confirmed. It was positively learned, however, that the company has made an inquiry for 10,000 tons, and quotations will be made when the reorganization of the company has been completed. The iron, it is understood, is to be used in making rails at the new plant recently finished at Sault Ste. Marie. The Canadian government has guaranteed protection to the extent of $7 a ton for rails when it can be shown that they can be produced in that country. If the company is successful in the enterprise, it is believed that low prices for pig iron will be conceded, as furnaces are very desirous of shipping iron out of the country. Some large inquiries are also being made for foundry iron. The Wheeling Mold & Foundry Co., of Wheeling, W. Va., is in the market for about 30,000 tons, and contracts are likely to be placed this week. There is some sharp competition for the business, but it is not expected that low prices will be quoted on the order, as deliveries will extend over a period of 18 months. The Wheeling concern has been awarded half of the 64,000 tons of castings required for the Pennsylvania Railroad's North river tunnel and the iron for which negotiations are now being made is to be used on this contract. It is possible that the Wheeling Co. may get the other half of the contract also. Outside of these inquiries and sales of a few small lots of different grades the pig iron market has been quiet. Prices remain about the same as a week ago but foundry No. 2 has dropped 25c. a ton. Production of pig iron has not declined any, and is now at the rate maintained as an average for the last two years.

The iron and steel mills in the Pittsburg district continue in steady operation, although but little new business is being booked except in wire products, pipe and tin plate. It is reported that the heavy stock of tin-plate carried by the American Sheet & Tin-Plate Co. is practically exhausted, but this is doubted. All the tin-plate mills of the company are in full operation except the 7-mill plant at Lisbon, O., and most of the independents are running. The Pittsburg independent wire interest is crowded with orders, having enough business booked to keep it in steady operation until the end of the year. There are indications of an improvement in the plate market. Several railroads are making inquiries for steel cars and the Pennsylvania and Wabash are expected to place orders for 2,000 cars each within a short time; these orders alone will require 40,000 tons of steel plates.

The third week of the annual convention of the Amalgamated Association of Iron, Steel & Tin Workers opened to-day and it is expected that the business will be concluded by Friday. Conferences with the manufacturers on the iron wage scale will take place at Cambridge Springs, Pa., some time this month. It is understood that the workers will demand a continuation of the present scale. The manufacturers, however, will insist on a cut. The bi-monthly examination of the sales-sheets for bar iron under the scale was made during the week. It showed that the average selling price for bar iron for March and April was 1.3c. and the puddling rate of $5.25 a ton will continue during May and June, when the present scale expires. The recommendation of President T. J. Shaffer, of the Amalgamated Association, that all mills be declared open, caused considerable comment here and the action of the delegates on the question is being awaited with considerable interest. The report that Shaffer had made such a suggestion was not credited until the matter was officially recorded in the *Amalgamated Journal*. As the tin-plate and sheet scales were recently reduced 18%, it is not likely the convention will authorize any further change.

Pig Iron.—The pig iron market this week consists principally of inquiries and the outlook is fairly good. Some few small lots of all grades were sold during the week indicating that prices are now down about as low as they likely will go. Bessemer is still quoted at $12.75@$13, Valley furnaces. Foundry No. 2 has declined 25c., a sale having been made at $13.35, Pittsburg. A few small lots sold at $13.60. Gray forge is quiet and is quoted at $12.75@$13, Pittsburg.

Steel.—Sales of bessemer steel billets are very light this week. It is again reported that the association price of $23 is being shaded from 50c. to $1 a ton. The plate market is good and the price is firm at 1.60c. Steel bars remain at 1.35c. but trade is dull.

Sheets.—A heavy tonnage in sheets is being booked, but at very low prices. Some of the independents are said to be rejecting orders. No. 28 gauge black sheets are selling as low as 2.20c. and galvanized at 3.25c.

Ferro-manganese.—There is but little doing, and 80% domestic continues to be quoted at $41.50 per ton.

Cartagena, Spain. April 30.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—No shipments are reported for the week. A number of charters are noted, however, and business for forward delivery is good. The production of iron ore from this province, Murcia, in 1903, was 735,000 tons, an increase of 6,000 tons over the previous year. Exports were 375,000 tons, Cartagena; 168,000 tons, Porman; 143,000 tons, Aguilas, and 26,000 tons, Mazarron.

Current quotations for iron ore are: Ordinary 50% ore, 6s. 6d@6s. 9d.; special low phosphorus, 7s.@7s. 6d.; specular ore, 58% iron, 9s.; magnetic ore, 60%, 11s. 3d. for lumps and 9s. 3d. for smalls. Manganiferous ores range from 14s. 3d. for 20% iron and 20% manganese down to 9s. 6d. for 35% iron and 12% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. 3d. per ton.

CHEMICALS AND MINERALS.

(See also Wholesale Prices-Current page 830.)

NEW YORK, May 18.

Already there is a relaxation in demand in certain quarters in anticipation of the election. In raw materials there is quite a depreciation in consumption so far this year, nitrate of soda being the exception. Some uneasiness is felt abroad at the growing production of sulphur in America, and the intended early working of Mexican deposits controlled by Americans. An innovation in this direction is the recent option on sulphur land in Tezuitlan, Pueblo, Mexico, taken by the Dupont Powder Co., of Delaware. The Southern fertilizer combination, the Virginia-Carolina Chemical Co., already owns extensive deposits in Mexico.

The Castner-Kellner Alkali Co., Ltd., has declared a 4% dividend for the year ending March 31, 1904, which is less than in 1902-3, as a result of unfavorable trade conditions. The net profit in the past year was £42,021 ($210,105), and after providing for all expenses £11,800 ($59,000) has been carried forward.

Cyanide.—Imports are better, but export trade is quiet. Quotations remain 19@20c. per lb.

Bleaching Powder.—Odd lots have been picked up on dock at fractionally less than contract prices, which rule at $1.20@$1.25 for prime brands, according to make.

Copper Sulphate.—Comparatively few sales of large size are reported, primarily because the export season is nearing the end. First hands continue to quote $5.05@$5.10 per 100 lb.

Acids.—A slight improvement is noticeable in the deliveries of commercial acids, while prices continue firm.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l.	$5.10@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°, bulk, ton	1.05 18.00@20.00
Nitric, 36°	4.50	Sulphuric, 66°, bulk, ton	1.20 21.00@23.00
Nitric, 38°	4.75		
Nitric, 40°	5.00		
Nitric, 42°	5.50		

Brimstone.—Spot sales are too small to affect the price of futures, although the primary market appears to be firmer. Best unmixed seconds are worth $21.75@$22 per ton, while thirds are nominally 50c. less.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, of Messina, write under date of April 30 that arivals of mineral from the mines in March slackened off, owing no doubt to the strikes and the bad weather. Stocks at end of March fell to 334,965 tons from 370,589 tons reported in February. Exports from January to March, inclusive, were 136,418 tons, against 148,082 tons last year. The deficiency in exports to the United States is due to the competition of the Louisiana mines, which produced last year 35,000 tons, and in 1904 hope to increase this to 120,000 tons. The cost of production was only $2.62 a ton. It was reported that 2,000 tons were being shipped to Sweden, the high price of Sicilian acting as a great stimulus. Three Norwegian paper mills have completed the change of their burners, and henceforth will use 10,000 tons pyrites annually instead of brimstone. The economy in burning pyrites is stated to be only 5 krones, or less than 6s. ($1.44) a ton. The Louisiana mines offer to take any contract at 1s. (24c.) less than the Anglo-Sicilian Company's price. We quote, per long ton, f. o. b., as follows: Best unmixed seconds, bulk, 81s. 9d.; best thirds, 79s. 6d.; current thirds, 78s.; refined block, bulk, 90s. 6d.; refined block in bags, prompt, 93s. 3d.; refined roll, bags, prompt, 96s. 6d.@102s.; sticks, prompt, 105s. 9d.@108s. 3d.; sublimed flowers, pure, in bags, prompt, 109s.; current, 101s. 3d. and commercial, 95s. 6d.; best seconds ground, prompt, 91s. For August-December shipment prices are 2s. per ton less.

Pyrites.—Arrivals from Spain are usually noted at New York at long intervals, and with receipts at other ports rather small, it appears that this year will show quite a falling off in imports. Prices continue unchanged.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Phosphates.—Mining is gradually assuming activity, and shipments are beginning to show a healthy expansion. In April Savannah exported 21,569 tons Florida high-grade rock, which is the largest quantity this year, and brings the total for the four months to 51,072 tons, as against 58,886 tons in 1903. Prices are hardening, and abroad there is little disposition shown to encourage sales for long periods at the present margin.

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%	$7.00@$7.25	$10.07@11.63
land pebble, 68@73%	3.75@ 4.00	7.35@ 8.05
†Tenn. 78@80%	4.00@ 4.25	9.88@10.66
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock	3.25@ 3.50	.....
river rock, 55@60%	3.00@ 3.25	5.75@ 6.56
Algerian 63@70%	....	6.82@ 7.32
58@63%	....	6.05@ 6.50
53@58%	....	4.95@ 5.00
Tunis (Gafsa)	....	5.75@ 6.50
Christmas Isle, 80@85%	....	12.79@13.20
Ocean Isle, 82@88%	....	13.18@14.03
Somme, Fr., 70@75%	....	10.63@11.02
Bordeaux, Fr., 60@65%	....	7.60@ 7.72
55@60%	....	6.44@ 6.55
Liege, Bel., 60@65%	....	7.00@ 7.10

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Nitrate of Soda.—Market conditions here are particularly strong. The Chilean situation has become firmer since the loss of a steamer's cargo off the coast. In New York spot and nearby arrivals are quoted $2.25@$2.30 per 100 lb., and futures at $2.05@$2.15, according to position.

Sulphate of Ammonia.—Practically nothing is being done in this market, hence quotations at $3.05@$3.10 per 100 lb. for gas liquor are nominal.

METAL MARKET.

New York, May 18.

Gold and Silver Exports and Imports,

At all United States Ports in April and Year.

Metal	April 1903.	April 1904.	Year 1903.	Year 1904.
Gold:				
Exports.	$1,705,466	$19,473,657	$4,340,385	$23,881,296
Imports.	1,349,621	10,289,839	9,745,656	32,405,409
Excess	I. $355,845	I. $9,183,788	I. $5,405,271	I. $ 8,544,213
Silver:				
Exports.	2,691,472	3,707,206	13,800,517	16,371,225
Imports.	1,657,574	2,215,436	6,317,908	9,039,839
Excess	E. $1,033,898	E. $1,491,770	E. $7,482,609	E. $7,331,386

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending May 14 and for years from January 1.

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.
Week	$13,972,312	$43,969	$327,845	$ 9,342
1904	44,459,258	1,805,970	15,529,295	283,806
1903	3,936,948	2,415,399	6,500,665	706,101
1902	16,450,001	1,044,862	11,619,277	474,448

Nearly all the gold exported went to France; the silver to London. Imports were principally from Central America.

There were further engagements of gold for export since our last writing. These amounted to $11,250,000, bringing up the total since the present movement began on April 7, to $58,750,000. Of this total, about $16,000,000 can be traced directly to the Panama Canal payments.

Exports of merchandise from the United States in April were valued at $109,995,160, being $9,832,055 less than in March. For the four months ending April 30 the statement of the Bureau of Statistics, of the Department of Commerce and Labor, gives the following figures:

	1903.	1904.
Exports	$501,499,472	$490,758,051
Imports	351,709,595	346,253,096
Excess, exports	$149,789,877	$144,504,955
Add excess of exports, silver		7,331,386
Total		$151,836,341
Deduct excess of imports, gold		8,544,213
Balance of exports		$143,292,128

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending May 14, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$928,939,200	$1,078,928,600
Deposits	920,835,500	1,129,615,400
Circulation	44,269,900	36,003,700
Specie	168,756,400	218,134,500
Legal tenders	70,445,100	77,096,600
Total reserve	$239,201,500	$295,231,100
Legal requirements	230,208,875	282,403,850
Balance surplus	$8,992,625	$12,827,250

Changes for the week this year were increases of $7,898,600 in loans and discounts, $229,100 in circulation, and $2,055,100 in legal tenders; decreases of $2,097,400 in deposits, $12,476,400 in specie, and $9,896,950 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver	1904. Gold.	1904. Silver.
N. Y. Ass'd	$920,835,500	.....	$1,129,615,400	.....
England	176,874,810	.....	166,886,430	.....
France	497,228,090	$222,451,980	509,175,540	$223,720,500
Germany	170,985,000	60,075,000	170,010,000	59,735,000
Spain	72,526,000	100,740,000	73,505,000	98,850,000
Netherlands	19,674,500	32,508,000	27,356,500	32,556,500
Belgium	15,666,665	7,833,335	15,760,000	7,880,000
Italy	88,680,000	11,292,000	110,300,000	19,099,000
Russia	384,670,000	42,800,000	425,715,000	42,380,000
Austria	229,640,000	65,345,000	236,065,000	64,445,000

The returns of the Associated Banks of New York are of date of May 14, and the others May 12, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Special inquiries have of late supported silver above the Indian equivalent, but there has not been any very decidedly strong tone to the market.

The United States Assay Office in New York reports receipts of 85,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to May 5 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904	Changes.	
India	£2,610,600	£4,086,203	I.	£1,476,203
China	168,156	100,781	D.	67,375
Straits	148,391	58,103	D.	90,288
	£2,926,547	£4,245,087	I.	£1,319,540

Receipts for the week this year were £229,000 in bar silver from New York, £21,000 from the West Indies, and £6,000 from Australia; total, £256,000. Shipments were £120,414 in bar silver to Bombay, £29,781 to Hong Kong, and £20,000 to Calcutta; total, £170,195.

Indian exchange has been firm under the influence of a good demand for money in India. The Council bills offered in London were all taken at an average of 16.03d. per rupee. More gold has gone from Australia to India. Buying of silver for Indian account has been somewhat better. There has also been some speculative buying, probably induced by the expectation that silver will be needed by Russia for its operations in the East.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.44¾	$0.46½
Peruvian soles and Chinese pesos	.40	.42½
Victoria sovereigns	4.85⅓	4.87
Twenty francs	3.86	3.88
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

May.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb	Copper. London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter. N. Y., Cts. per lb.	Spelter. St. Louis, Cts. per lb
12	13 @13⅛	12¾ @12⅞	12⅛ @12⅜	57⅛	27⅝	4.45 @4.50	5.12½	4.95
13	13 @13⅛	12¾ @12⅞	12⅛ @12⅜	57⅜	27⅝	4.45 @4.50	5.12½	4.95
14	13 @13⅛	12¾ @12⅞	12⅛ @12⅜	....	27⅛	4.45 @4.50	5.12½	4.95
16	13 @13⅛	12¾ @12⅞	12⅛ @12⅜	57¼	27⅛	4.45 @4.50	5.07½	4.90
17	13 @13⅛	12¾ @12⅞	12⅛ @12⅜	56⅞	27¾	4.45 @4.50	5.07½	4.90
18	13 @13⅛	12¾ @12⅞	12⅛ @12⅜	57	27⅞ @28	4.45 @4.50	5.00 @5.05	4.85 @4.90

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

May.	Sterling Exchange.	Silver. New York, Cts.	Silver. London, Pence.	May.	Sterling Exchange.	Silver. New York, Cts.	Silver. London, Pence.
12	4.86⅞	56⅛	25 3/16	16	4.86⅞	55⅝	25 1/16
13	4.86⅞	55⅞	25 1/16	17	4.86⅞	55⅝	25 1/16
14	4.86⅞	55¾	23⅞	18	4.86⅞	55¾	25 1/16

New York quotations are for fine silver per ounce Troy. London prices for sterling silver, .925 fine.

Copper has ruled very dull indeed throughout the week, and transactions are few and far between. Absolutely nothing of interest has transpired. The closing quotations are given as 13@13⅛ for Lake copper; 12¾@12⅞ for electrolytic in ingots, cakes and wirebars; 12½@12⅝ in cathodes; 12⅜@12⅝ for casting copper.

The market for standard copper in London, which closed last week at £56 7s. 6d., opened on Monday at £57 5s., and the closing quotations on Wednesday are cabled as £57@£57 2s. 6d. for spot, £57@£57 2s. 6d. for three months.

Statistics for the first half of May show a decrease in the visible supplies of 400 tons.

Refined and manufactured sorts we quote: English tough, £61 5s.@£61 10s.; best selected, £62 5s.@£62 10s.; strong sheets, £72 5s.@£72 15s.; India sheets, £70 5s.@£70 15s.; yellow metal, 6⅜d.@6½d.

Exports of copper from Baltimore for the week ending May 17 are reported by our special correspondent at 1,338 long tons to Germany and Great Britain. Imports were 1,231 tons copper ore from Daiquiri.

Tin has ruled rather flat, as low as 27½ having been accepted on Monday. Since then a very sharp reaction has set in, the market closing strong at 27⅞@28c. for spot, 27⅝@27¾ for futures. There has been very good consumptive buying on the decline.

The foreign market, which closed last week at £125, opened on Monday at £123 15s., advanced on Tuesday to £124 15s., and the closing quotations on Wednesday are cabled as £126@£126 1s. 3d. for spot, £125@£125 1s. 3d. for three months.

Lead is quiet and unchanged. The ruling quotations are 4.45@4.50 New York, 4.37½@4.42½ St. Louis.

The foreign market is lower, Spanish lead being quoted at £11 13s. 9d.; English lead, £11 16s. 3d.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 30, that the price of silver during the week has been 14 reales per oz., exchange remaining at 34.87 pesetas to £1. Local quotation for pig lead on wharf has been 69.50 reales per quintal, which, on current exchange, is equal to £11 3s. per long ton, f. o. b Cartagena.

Spelter.—The present quiet state of affairs in the galvanizing industry has reflected on the spelter market, and prices have showed quite a decline. At the lower values established, however, there has been a somewhat better demand. The closing quotations are 4.85@4.90c. St. Louis, 5@5.05c. New York.

The foreign market is steady, good ordinaries being quoted at £22 2s. 6d.; specials, £22, 7s. 6d.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 30, that prices are well maintained and business is good. Quotations continue 65 fr. per ton for blende, 35%, and 45 fr. for calamine, 30% zinc.

Antimony is dull. We quote Cookson's at 7@7½; Hallett's, 6¾@6⅞; Hungarian, Japanese, French, Italian, U. S. and Chinese, 6@6¼c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—The New York price is $45 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders, and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—Herr Paul Speir writes from Breslau, under date of April 30, as follows: Cadmium, guaranteed 99.5% metal, is very firm. For quantities of 500 kg. or over, quotations are 700@725 marks per 100 kg., f. o. b. Hamburg, net cash, packing included.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1, 99% ingots	33@37c.	Ferro-chromium (74%)	12½c.
No. 2, 90% ingots	31@34c.	Ferro-Tungsten (37%)	38c.
Rolled Sheets	4c. up	Magnesium, pure (N. Y.)	60c.
Alum-bronze	20@22c.	Manganese	$2.75
Nickel-alum	33@39c.	Mangan'e Cop. (20% Mn)	32c.
Bismuth	$2.10	Mangan'e Cop. (30% Mn)	38c.
Chromium, pure (N. Y.)	80c.	Molybdenum (Best)	$2.00
Copper, red oxide	50c.	Phosphorus, foreign	45c.
Ferro-Molybde'm (50%)	$1.25	Phosphorus, American	70c.
Ferro-Titanium (10%)	90c.	Sodium metal	50c
Ferro-Titanium (20@25%) N. Y.	55c.	Tungsten (Best)	88c.

Variations in price depend chiefly on size of order.

Thallium is quoted at 60@65 marks per kg., at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f. o. b. Bremen.

Missouri Ore Market. May 14.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore was $39 per ton, and the assay basis price $34@$36 per ton of 60% zinc. The week opened with the market weak and purchases easy, but as it developed toward the latter part of the week that there was going to be an enormous shipment, the larger demand occasioned a stronger market, and some bins of ore were advanced 50c. and $1 per ton. These were mostly medium grades and do not affect either the top price nor the range of the assay basis.

Ten consecutive weeks of strong lead prices has resulted in a steadily increasing output of this material. The price is $58 per ton. A year ago it was $54.

Following are the shipments of zinc and lead ores from the various camps of the district for the week ending May 14, together with the total shipments of the year and the value to date.

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,124,600	348,560	$64,790
Webb City-Centerville	2,745,820	529,880	58,920
Galena-Empire	1,046,730	224,020	22,195
Duenweg	936,190	105,650	19,395
Aurora	951,600	.....	15,160
Alba-Neck	713,530	42,570	14,070
Granby	722,000	58,000	11,960
Carthage	427,490	.....	7,695
Prosperity	345,710	8,280	6,470
Badger	186,150	.....	3,350
Oronogo	184,280	11,540	2,620
Mitchell	104,340	.....	2,035
Beef Branch	64,070	45,330	1,570
Carl Junction	67,510	.....	1,240
Diamond	48,690	.....	825
Spurgeon	55,020	.....	495
Totals	11,723,730	1,373,830	$222,800
Twenty weeks	205,451,580	25,514,760	$4,139,250

Zinc value: The week, $183,655; 20 weeks, $3,422,580.
Lead value: The week, $39,145; 20 weeks, $716,670.

The district total value this week passed $4,000,000, two weeks ahead of last year, the value of the 20 weeks being $348,140 greater this year than last, while the shipment was 8,419 tons of zinc and 1,608 tons of lead larger. Compared with the previous week the gain is 346 tons of zinc and 29 tons of lead, and compared with a year ago the gain is 1,626 tons of zinc and 185 tons of lead.

Average Prices of Metals per lb., New York.

Mo.	Tin. 1903	Tin. 1904.	Lead. 1903.	Lead. 1904.	Spelter. 1903.	Spelter. 1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	28.317	4.442	4.475	5.349	5.067
April.	29.81	28.132	4.567	4.475	5.550	5.219
May ..	29.51	.....	4.325	.....	5.639	....
June..	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.962	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	28.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.238	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February 4.717c.; March, 4.841c.; April, 5.038c.

Average Prices of Copper.

Mo.	New York. Electrolytic. 1903.	Electrolytic. 1904.	Lake. 1903.	Lake. 1904.	London. Standard. 1903.	Standard. 1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	12.299	14.572	12 551	63.85	57.321
April.	14.454	12.923	14.642	13.120	61.72	58.247
May..	14.435	.....	14.618	.....	61.73	.....
June.	13.542	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12,813	.....	56.30	.....
Dec. .	11.952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902. London. Pence.	1902. N. Y., Cents.	1903. London Pence.	1903. N. Y., Cents.	1904. London, Pence.	1904. N. Y., Cents.
Jan..	25.62	55.56	21.98	47.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	26,164	56,741
April.	24.34	52.72	23.38	50.56	24 974	54.202
May..	23.71	51.31	24.89	54.11	.....	.....
June.	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Allouez, Mich.	May 26	.....	$1.50
Allouez, Mich.	Sept. 26	.....	1.50
Belmont, Utah	May 7	June 5	.10
Caledonia, Nev.	May 31	June 21	.15
Con. Cal. & Va., Nev.	May 20	June 10	.25
Galena, Utah	May 7	May 28	.02
Good Hope, Utah	May 19	June 11	.03½
Hale & Norcross, Nev.	May 31	June 24	.10
Johnny, Utah	May 9	June 9	.06
Naildriver, Utah	June 3	.....	.03
Mexican, Nev.	June 13	July 7	.15
Sierra Nevada, Nev.	June 8	June 27	.10
Skylark Copper, Utah	June 15	July 5	.01
Utah Con., Nev.	June 6	June 27	.10
Utah Mont., Utah	May 26	June 10	.01
Wabash, Utah	May 23	June 14	.05
White Pine Copper, Nev.	June 10	.....	.08
Yellow Jacket, Nev.	June 10	July 13	.10

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Amalgamated Cop'r.	May31	.50	$769,460	$24,278,276
‡Anaconda Copper	May 19	.50	600,000	23,850,000
*Daly West, Utah	May 16	.40	72,000	4,031,000
Esperanza, Mex.	June 15	.25	113,750	1,267,949
Greene Con. Copper.	May 25	.30	259,200	911,020
Iron Silver, Colo.	June 1	.10	50,000	3,000,000
*Kendall, Mont.	May 20	.05	25,000	455,000
*Lightner, Cal.	May 20	.05	5,112	212,180
N.Y.& Hond. Rosario.	May 2	.10	15,000	1,830,000
‡Mex. Coal & Coke.	June 1	3.00	150,000	150,000
*Mines Co. of Am.	May 20	.01¼	25,000	580,000
†Standard Oil.	June 15	8.00	7,760,000	231,260,000

* Monthly. † Quarterly. ‡ Semi-annually.

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	May 11 H.	May 11 L.	May 12 H.	May 12 L.	May 13 H.	May 13 L.	May 14 H.	May 14 L.	May 16 H.	May 16 L.	May 17 H.	May 17 L.	Sales.
†Amalgamated, c.	$100	49	47¾	49⅝	48¾	51	49⅛	50⅞	49⅛	49⅛	48⅞	49⅛	48¾	227,710
Anaconda, c.	25	....	....	76	....	78	76	....	....	75½	75	....	....	1,600
Best & Belcher, s.	3	....	....	....	....	....	....	1.50	....	1.50	....	....	....	200
Brunswick	1	....	....	.06	.05	....	....	....	....	....	....	....	....	600
Chollar, s., g.	2½	....	....	....	....	....	....	....	....	.21	....	....	....	300
C. K. & N., g.	1	25	....	27	23	....	....	....	....	....	....	....	....	1,500
Con.Cal.&Va., g.s.	2½	....	....	1.70	....	....	....	....	....	1.65	....	....	....	200
Con. Imperial	....	....	....	....	....	....	....	....	....	.03	....	....	....	500
Cripple Creek, g.	1	9	....	8	....	....	....	9	8	....	....	8	....	3,500
Crown Point	1	....	....	....	....	....	....	....	....	....	....	....	....	50
Daly	20	....	....	....	....	....	....	2.25	....	....	....	....	....	600
Elkton, g.	1	....	....	67	....	....	....	....	....	....	....	66	65	500
El Paso, g	1	....	....	....	....	....	....	....	....	....	....	....	....	800
Gold Dollar	1	....	....	....	....	....	....	....	....	.06	....	....	....	1,000
Gould & Carry	1	.33	....	....	....	....	....	....	....	....	....	....	....	8,245
Greene Con., c.	10	15⅜	15¼	15⅝	15	15⅝	15⅛	15	....	15⅛	14¾	14⅞	14⅝	100
Hale & Norcross	3	....	....	....	....	....	....	....	....	....	....	62	....	1,000
Homestake, g.	100	....	....	....	....	....	....	....	....	....	....	....	....	140
Isabella, g.	1	....	....	33	....	34	33	....	....	....	....	....	....	120
Jack Pot, g.	1	....	....	....	....	....	....	....	....	....	....	....	....	80
Leadville	10	....	....	....	....	.04	.03	....	....	....	....	....	....	1,000
Little Chief, g. s.	50	....	....	....	....	....	....	5	....	....	....	....	....	500
Mexican, s.	3	1.85	....	....	....	1.90	1.85	1.95	1.90	....	....	1.85	....	1,000
Mollie Gibson, g.	5	5	....	....	....	....	....	....	....	4½	....	....	....	1,500
Occidental, s.	3	....	....	1.80	....	....	....	....	....	....	....	....	....	100
Ophir, s.	3	....	....	5.00	....	5.50	....	....	....	....	....	5.25	....	300
Overman, s.	2	....	....	....	....	....	....	.04	....	.30	....	....	....	300
Pharmacist, g.	1	....	....	....	....	....	....	.08	....	....	....	....	....	2,000
Phoenix, g.	1	....	....	....	....	....	....	1.70	....	....	....	....	....	800
Portland, g.	1	.70	....	....	....	....	....	....	....	....	....	11	....	200
Potosi, s.	1	.15	....	....	....	....	....	....	....	....	....	....	....	1,000
Quicksilver, Pf.	100	....	....	....	....	.17	....	....	....	....	....	18	....	....
Sierra Nevada, s.	3	.43	.42	....	....	....	....	....	....	.48	....	....	....	900
Silver Hill, g. s.	1	....	....	.63	....	....	....	....	....	....	....	....	....	200
StandardCon.,g.s.	10	....	....	....	....	....	....	....	....	5.35	....	....	....	100
Tennessee, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Con., g. s.	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Copper	10	⅝	....	....	....	⅝	....	....	....	⅝	....	....	....	800
White Knob, c.	10	....	....	.07	....	....	....	....	....	7¼	....	7	....	300
Work, g.	1	.08	.07	.08	....	....	....	....	....	....	....	....	....	3,500
Yellow Jacket	3	.22	....	....	....	....	....	....	....	....	....	....	....	400
Andes, s.	....	....	....	....	....	....	....	....	....	....	....	.20	....	200
Chrepollte	....	....	....	....	....	....	....	....	....	....	....	.10	....	1,000
Justice	....	....	....	....	....	....	....	....	....	....	....	.11	....	100
Savage	....	....	....	....	....	....	....	....	....	....	....	.35	.34	200
Utah	....	....	....	....	....	....	....	....	....	....	....	.08	....	500

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 234,385 shares.
†Ex-dividend.

BOSTON, MASS.

Company.	Par val	May 11 H.	May 11 L.	May 12 H.	May 12 L.	May 13 H.	May 13 L.	May 14 H.	May 14 L.	May 16 H.	May 16 L.	May 17 H.	May 17 L.	Sales.
AdventureCon.,c	$25	1¾	....	....	....	1¾	....	1¾	1¾	1¾	....	2	....	555
Allouez, c.	25	5¾	....	5½	5	....	....	....	....	4⅝	4¾	4⅝	4	1,571
†Amalgamated, c.	100	48⅝	47⅜	49⅝	48¾	50⅞	49⅛	50¾	49⅛	50	48⅞	49⅝	48¾	27,682
Am. Z. L. & Sm.	25	....	....	....	....	9¾	....	....	....	9⅝	....	9¾	9¼	425
Anaconda, c. s.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Arcadian, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Arnold, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic, c.	25	8	....	....	....	....	....	....	....	8	....	....	....	50
Bingham Con.	50	21⅞	21½	21⅝	21½	21¾	21	21¼	21	20¾	....	....	....	1,620
Bonanza Dev. g.	10	....	....	....	....	39	....	....	....	....	....	....	....	200
Calumet & Hecla	25	....	....	462	....	463	460	462	....	460	....	458	....	85
Centennial, c.	25	21⅞	20	20¼	19¾	20¼	19⅝	20	....	....	....	....	....	980
†Central Oil	25	....	....	....	....	....	....	....	....	8¼	7¾	....	....	300
Con. Mercur, g.	5	33	....	....	....	35	33	33	....	33	....	....	....	4,450
Copper Range	100	42¾	42	42⅝	42	44	42¾	43⅜	43	43	42	42½	42	3,803
Daly West, g. s. l	20	23	22¾	23⅛	22	22½	21¼	22¼	22	22	....	23	22½	1,540
Dominion Coal	100	....	....	....	....	67	66⅝	....	....	66	....	....	....	150
Preferred	....	....	....	....	....	....	....	....	....	....	....	110½	....	10
Dominion I. & S.	100	12	11⅝	11¾	11¼	11¾	....	....	....	....	....	....	....	140
Elm River, c.	12	....	....	....	....	2	1¼	....	....	2	....	....	....	120
Franklin, c.	25	....	....	7¾	....	....	....	....	....	....	....	7½	....	80
Granby Con.	10	3¾	3¾	3¾	....	3½	....	3¾	3	....	....	3¼	....	1,475
Guanajuato Con.	5	1⅝	....	....	....	1⅝	1½	....	....	....	....	....	....	400
Isle Royal Con.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Mass Con., c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Mayflower, c.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Michigan, c.	25	4⅜	....	....	....	....	....	....	....	4	....	....	....	55
Mohawk, c.	25	41½	41	41	40¾	40½	40	40¼	39¾	39⅞	....	39⅝	39⅜	1,348
Mont. Coal & C.	25	2⅞	2¾	4⅝	3	4½	....	4½	3½	4	3½	4¼	3¾	4,442
Mont'l & Boston.	5	....	....	....	....	....	....	....	....	.50	....	....	....	350
New Idria, q.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony, c.	25	....	....	....	....	80	....	....	....	....	....	....	....	50
Old Dominion, c.	25	....	....	....	....	12¾	12½	12¾	....	13	....	12½	....	505
Osceola, c.	25	56¾	56¼	....	....	57	56	....	....	56¼	56⅜	....	....	425
Parrot, s. c.	10	23¾	23½	....	....	24½	23¾	24⅜	24⅛	24¼	24¼	....	....	1,470
Phœnix Con, c.	25	1¼	1¾	....	....	....	....	2	1¾	....	....	....	....	335
Quincy, c.	25	81¼	80	80	....	80	....	....	....	....	....	80¾	....	183
Rhode Island, c.	25	....	....	....	....	90	....	....	....	....	....	....	....	100
Santa Fe, g. c.	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Shannon, c.	10	7⅜	....	7⅜	7¼	7¼	7	7¼	....	7⅜	7⅛	7¼	7⅜	1,313
Tamarack, c.	25	....	....	90	....	93	....	....	....	....	....	....	....	11
Trinity, c.	25	3⅞	3⅜	4	3⅞	3⅞	....	3⅞	3	....	....	4	....	1,065
United States, g.	10	....	....	20½	19¾	20¼	20	20½	20	20⅜	19⅞	20⅛	19⅞	1,016
U. S. Coal & Oil.	25	....	....	9¼	....	....	....	9¼	9	9¼	9	9⅜	....	500
Utah Con., g. c.	5	33⅜	33⅛	33⅛	33¼	34	33⅜	34⅛	....	34	33¾	33⅛	33⅜	4,377
Victoria, c.	25	3 7/8	....	3⅛	3	3	....	3⅛	3	3⅛	....	3⅛	....	755
Winona, c.	25	....	....	6	....	6	....	....	....	....	....	6 1/8	6	330
Wolverine, c.	25	....	....	71	....	....	....	....	....	70	....	70	....	60
Wyandot, c.	25	75	....	....	....	....	....	50	....	50	....	....	....	225

c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver. Total sales, 64,531 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	May 11 H.	May 11 L.	May 12 H.	May 12 L.	May 13 H.	May 13 L.	May 14 H.	May 14 L.	May 16 H.	May 16 L.	May 17 H.	May 17 L.	Sales
Allis-Chalmers	$100	....	....	....	....	6	....	....	....	....	....	6½	6	1,000
Preferred	100	39½	....	....	....	....	....	....	....	....	....	....	....	100
Am. Agr. Chem	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref.	100	49¼	48⅞	....	....	49⅜	49	49	....	49⅜	49	49⅜	49¼	3,860
Preferred	100	95¼	95	95½	95	95⅜	94⅜	95¼	95	95½	94⅛	49⅞	....	3,255
Col. Fuel & I.	100	....	....	30¼	....	30⅜	....	30	....	30⅛	30	29¾	28½	1,610
Col. & H. C. & I.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Crucible Steel	100	....	....	4⅞	4¾	4⅝	4½	....	....	4¾	....	4¾	....	305
Preferred	100	36⅝	36½	36¼	36	....	....	....	....	37	36¼	37½	37	2,267
General Chem	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Mong. R. Coal	50	....	....	....	....	....	....	....	....	....	....	8	....	300
Preferred	50	26	....	....	....	....	....	....	....	26	....	25	....	155
National Lead	100	17¾	17½	18⅜	17½	18⅛	17⅜	19⅜	18¾	18¾	18½	19¼	18¾	9,378
Preferred	100	....	....	....	....	....	....	90	90	91½	80	....	....	200
Phila. Nat. Gas	100	38⅝	....	....	....	38	....	38	37⅝	....	....	....	....	710
Preferred	100	....	....	44	....	....	....	....	....	....	....	....	....	15
Pittsburg Coal	100	....	....	15½	....	....	....	15	15¼	15	....	15½	15	450
Preferred	100	27	....	56¼	56	52½	50⅜	55⅜	53¼	56⅜	56	56	55⅜	1,221
Republic I. & S.	100	65⅞	64½	64⅞	63⅝	63⅝	63⅛	64⅛	63⅛	64	6	64	63⅝	5,900
Preferred	100	40¾	39	39½	37⅞	39¼	37	38½	37⅜	38½	37⅜	39	38¼	21,980
Sloss-Shef S. & I.	100	....	....	37	36	36	....	37	....	36½	....	36	....	800
Preferred	100	....	....	....	....	79¾	....	....	....	....	....	....	....	30
Standard Oil	100	628½	628	629	....	627½	....	630	....	625	....	625	....	67
Tenn. C.I. & R.R.	100	34⅞	34¼	34½	32¾	33¼	32⅜	33	32½	32⅜	31⅜	33⅛	32¼	17,817
U.S. Red. & Ref.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
U.S.Steel Corp.	100	10	9¼	9¼	9	9¼	8⅞	8⅝	8⅝	8⅝	8⅛	9	8⅝	85,232
Preferred	100	55¼	53⅜	53¼	51¾	52⅜	51⅛	52⅛	51⅜	52¾	51⅝	53½	52¼	272,827
Va.-Car Chem.	100	27½	....	27¾	27	27¼	....	27⅝	....	....	....	27⅝	....	1,245
Preferred	100	101	....	101	....	101	....	....	....	100½	....	....	....	430

*Pittsburg exchanges; all others, New York. Total sales, 431,155.

COLORADO SPRINGS, COLO.

Company.	Par Val	May 7 H.	May 7 L.	May 9 H.	May 9 L.	May 10 H.	May 10 L.	May 11 H.	May 11 L.	May 12 H.	May 12 L.	May 13 H.	May 13 L.	Sales
Acacia	$1	.06⅜	.06	0-¼	.03	.06¼	.06	.06¼	.06⅛	.06½	.06	.06½	.06⅝	4,000
Anaconda	5	.12	....	.12	....	.12	....	.16	.12¼	.16	.12	.16	.12	....
Colo. City & M.	1	.02⅝	.02⅜	.02¾	.02¼	.02⅝	.02⅜	.02¾	.02⅜	.02¾	.02¼	.02⅝	.02¼	....
C. K. & N.	1	.25	....	.30	.25⅞	.29½	.26½	.33	.29	.33	.30	.34	.30	3,000
Cripple Ck. Con.	1	.08¼	.07¾	.08	.07½	.08	.07¾	.08	.07⅜	.08	.07¾	.08	.07¾	3,000
Des Moines	1	.02⅛	.01½	.02¼	.01⅜	.02¼	.01¾	.02⅛	.01¼	.02⅛	.01⅜	.02⅛	.01½	....
Doctor-Jack Pot.	1	.05⅜	.04⅞	.05	.04¾	.05¼	.05	.06⅜	.06	.06⅜	....	.06¼	.06	10,000
Elkton Con.	1	.67	.66¼	.67½	.67	.67½	.67	.67	.66⅜	.67	.66½	.66¾	.66	13,200
El Paso	1	.88	.85	.85½	.85	.85	.84½	.85	.84	.85¼	.85	.85½	.85	17,200
Gold Dollar Con.	1	.05¼	.05	.05¼	.05	.05⅛	.05	.05⅛	.05	.05⅛	.05	.05⅛	.04⅞	17,000
Gold Sovereign	1	.06¼	.06	.06⅛	.06¼	.04¼	.06¼	.06⅜	.06¼	.06⅜	.06	.06⅜	.06¼	7,500
Golden Cycle	1	.45	....	.45	....	.45	....	.63	.45½	.45	....	.45	....	10,000
Golden Fleece	1	.02	....	.02	....	.02	....	.02	....	.02	....	.02	....	....
Hart	1	.02⅛	....	.02⅛	....	.02⅛	....	.02⅛	....	.02¾	....	.02	....	....
Isabella	1	.32¼	.30⅜	.32	.30	.33	.30	.33½	.32½	.33	.32	.33	.32	4,000
Jack Pot	1	.08	.05⅜	.09	.05	.09	.05	.05⅞	....	.09	.05	.09	.05	1,000
Keystone	1	.05	.04½	.05	.04¾	.04⅞	.04½	.04⅞	.04½	.04⅞	.04¾	.04¾	.04½	1,000
Last Dollar	1	.40	....	.40	....	.40	....	.40	....	.40	....	.40	....	....
Lexington	1	.04	.03¾	.04	.03¾	.04	.03¾	.04	.03¾	.04	.03¾	.04	.03⅞	....
Little Puck	1	.03⅜	.03½	.03⅜	.03¾	.03⅛	.03⅜	.03⅜	.03⅜	.03⅜	.03¼	.03⅛	.03⅜	35,000
Mollie Gibson	1	.05½	.05	.06⅜	....	.05⅜	.05	.05⅜	.05	.05⅜	.05	.05½	.05	4,425
Moon-Anchor	5	.09	.08	.09	.08	.09	.07½	.09	.08¾	.09	.08¾	.08	....	10,000
New Haven	5	.03⅛	.02¾	.03	.02⅞	.03	.02⅝	.03	.02¾	.03	.02⅞	.03	.02¾	1,000
Old Gold	1	.10	.09½	.10	.09½	.09⅞	.09	.10	.9¾	.10	.09½	.10	.09½	3,500
Pharmacist	1	.04⅛	.04	.04⅜	.04⅛	.04¼	.04	.04¼	.04	.04½	.04	.04⅜	.03⅞	5,000
Pinnacle	1	.03	....	.03	....	.03	....	.03	....	.03	....	.03	....	....
Portland	1	1.80	1.74	1.80	1.70	1.75	1.70	1.75	1.70	1.79	1.70	1.72½	1.70	1,500
Vindicator Con.	1	.75¾	....	.67½	....	.68	....	.65	....	.65	....	.80	.60	1,000
Work	1	.07¼	.07	.07¼	.07	.07⅜	.07¼	.07⅜	.07⅛	.07⅜	.07	.07¼	.07	6,000

Total sales, 159,125 shares.

SAN FRANCISCO.

Company.	Location.	May 5 H.	May 5 L.	May 6 H.	May 6 L.	May 7 H.	May 7 L.	May 9 H.	May 9 L.	May 10 H.	May 10 L.	May 11 H.	May 11 L.	Sales
Golden Anchor.	Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
MacNamara	Nev.	.19	....	....	....	.18	....	.18	....	.19	.18	.20	.19	15,000
Mont. Tonopah.	Nev.	1.55	1.52½	1.57½	1.55	1.57½	....	1.62½	1.60	1.65	1.62½	1.65	1.62½	7,250
Ton. Belmont.	Nev.	.71	.70	.70	....	.71	....	.72	.70	.73	.71	.73	.72	9,250
Ton. Midway	Cal.	.39	.38	.39	.38	.40	.39	.40	.39	.40	.39	.39	....	13,900
Ton. Mg. Co.	Nev.	....	....	....	....	9.00	....	9.12½	....	....	....	9.25	8.75	1,000
Ton. North Star.	Nev.	....	....	....	....	....	....	....	....	.30	....	....	....	500
....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

*San Francisco & Tonopah Mining Exchange.
Total sales, 46,900 shares.

COLORADO SPRINGS (By Telegraph).

Company.	May 16 H.	May 16 L.	May 17 H.	May 17 L.
Anaconda	.16	.12	.16	.12½
Cripple Ck Con.	.08¼	.08	.08¼	.08
C. K. & N.	.32	.30	.33½	.29
Doctor-Jack Pot.	.05¾	.05½	.05¾	.05⅜
Elkton Con	.65½	.64½	.64½	.63
El Paso	.84	.82	.81¾	.81¼
Gold Dollar Con.	.05	.04⅝	.05	.04⅝
Gold Sovereign	.06¾	.06¼	.06¾	.06⅛
Isabella	.32	.31¼	.32⅜	.30⅜

Company.	May 16 H.	May 16 L.	May 17 H.	May 17 L.
Jack Pot	.09	.05	....	....
Last Dollar	.40	.10	.35	.20
Mollie Gibson	.05¼	.04½	.05¼	.04½
Moon Anchor	.09	.08¼	.09¼	.08¾
Old Gold	.09½	.05½	.09½	.05½
Pharmacist	.03⅝	.03¼	.03⅝	.03⅜
Portland	1.75	1.70	1.75	1.65
Vindicator	.75	.65	.62	.58
Work	.07¼	.07	.07½	.06⅞

SAN FRANCISCO (By Telegraph).

Company.	May 16.	May 17.
Belcher	31	.30
Best & Belcher	1.45	1.50
Caledonia	.67	.67
Challenge Con.	.22	.20
Chollar	.19	.17
Confidence	1.10	1.10
Con. California & Virginia	1.70	1.65
Crown Point	.22	.19

Name of Company.	May 16.	May 17.
Gould & Curry	.19	.27
Hale & Norcross	.60	.60
Mexican	1.85	1.75
Ophir	5.25	5.25
Overman	.30	.28
Sierra Nevada	.45	.46
Union Con	.68	.67
Yellow Jacket	.23	.21

PHILADELPHIA, PA

Company.	Par val.	May 11 H.	May 11 L.	May 12 H.	May 12 L.	May 13 H.	May 13 L.	May 14 H.	May 14 L.	May 16 H.	May 16 L.	May 17 H.	May 17 L.	Sales
Am. Cement.	$10	....	....	....	....	....	....	....	....	....	....	....	....	....
Cambria Iron	50	....	....	....	....	46	....	....	....	....	....	....	....	11
Cambria Steel	50	19¾	19½	19¾	19⅜	19⅜	....	19⅜	19⅛	19⅜	19⅛	19¼	19⅛	1,304
Penn. St. Pf.	100	....	....	....	....	64	....	....	....	....	....	....	....	25
United Gas I.	50	83¼	83	83¼	82⅝	82⅞	82¼	82¾	82¼	82⅛	81	82	81¼	1,222
*Lehigh Nav.	50	....	....	74½	74	....	....	....	....	....	....	74¼	74	129
Philadelphia	50	....	....	38¼	....	38¼	38	37¾	37¾	37¾	....	37⅝	....	1,197
U.S. Steel.	100	10	9¼	9 5/16	8 13/16	9⅛	8 5/16	8 5/16	8¼	8 11/16	8 9/16	9	8¾	18,435
U.S. Steel pf.	100	55¼	53¾	53	51¼	52⅝	51⅞	52	51⅝	52½	51¾	53	52⅝	19,351

*Ex-dividend. Total sales 41,734.

STOCK QUOTATIONS

ST. LOUIS, MO.* May 14

Name.	Par Val.	Prices. Bid.	Ask.	Name.	Par Val.	Prices. Bid.	Ask.
Ann.-Nettie, Colo...	$10	$0.15	$0.25	Columbia Lead, Mo.	$10	$3.50	$4.50
Catherine Lead, Mo.	10	1.40	2.00	Con. Coal, Ill.....	100	15.00	18.00
Central Coal & C....	100	61.50	63.00	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf..	100	70.00	72.00	Granite Bimet. Mt..	10	.35	.40
Central Lead, Mo...	100	110.00	115.00	St. Joe Lead, Mo,...	10	14.50	17.50

*By our Special Correspondent.

SALT LAKE CITY.* May 14

Company	Par Val	High	Low	Sales.	Name of Company	Par Val	High	Low	Sales.
Ajax.....	10	.15	.11¼	600	L. Mammoth..	1	.20	.18	1,000
Butler Liberal.	1	.12¾	.12½	1,250	M. Washington	½	.01	⅞	8,500
Carisa.....	1	.07¾	.06	5,000	May Day.....	¼	.07	.04½	23,500
Century.....	1	.78	.....	200	N. Y. Bonanza	1	.11½	.09¾	5,700
Con. Mercur...	5	.34	.30	3,400	Petro.....	1	.05	.....	600
Daly.....	5	2.50	2.40	400	Sacramento....	5	.16	.15	9,000
Daly West.....	20	23 00	22.25	515	Silver King....	20	55.00	54.50	155
Grand Central.	1	4.85	.....	200	Silver Shield...	1	.02¼	.01⅜	9,000
Ingot.....	½	¾	.....	500	Star Con.....	1	.14½	.13¾	4,300
Joe Bowers....	1	⅜	⅛	7,000	Stockton.....	1	.75	.....	1,000
La Reine	1	.05½	.....	1,700	Tetro.....	1	.31	.27½	6,400
Little Chief....	1	.01⅛	.....	5,000	Uncle Sam, Con	1	.19½	.18	8,000
.....	.....	.....	.....	.....	Yankee Con....	1	.36½	.31	4,400

*By our Special Correspondent. All mines are in Utah. Total sales, 106,810 shares.

DULUTH, MINN.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona.....	$10	$105	$107	Lake Sup. & Pitts Dev..	$10	$150	$155
Calumet & Bisbee.....	10	3.00	4.50	Pitts. & Duluth Dev....	15	38.00	40.00
Calumet & Cochise.....	10	5.00	5.50	Shakespeare.....	10	.....	.20
Calumet & Pittsburg...	10	30.00	32.00	United Mexican.....	10	.....	.50
Higgins Development..	10	2.00	2.50	Wolverine & Arizona...	10	3.50	.....
Junction Development	15	20.00	21.00	Yaquí.....	10	.....	1.00

TORONTO, ONT. May 14

Company.	Par val	Prices. High.	Low.	Company.	Par val	Prices. High.	Low.
Black Tail, g.....	$1	.....	.....	Mountain Lion, g.....	$1	.....	.....
Cariboo-McKin	1	.....	.....	Payne, s. l.....	1	.13	.09
Cariboo-Hydr.....	1	.....	.....	Rambler Carib	1	.26	.22
Center Star, g. s.....	1	.28	.25	St. Eugene, g. s.....	1	.50	.42
.....	....	.....	.....	War Eagle Con.....	1	.14	.10
.....	....	.....	.....	White Bear.....	1	.04½	.03½

g—Gold. l—Lead. s—Silver.

MEXICO. May 6

Company.	Shares Issued	Prices, Mex. Bid.	Ask.	Company.	Shares Issued.	Prices, Mex. Bid.	Ask.
Durango:				Trompillo.....	1,200	$1,705	$1,720
Ca. Min. de Penoles..	2,500	$3,590	$3,700	San Rafael y An., aviada.....	1,200	710	705
San Andres de la Sierra	200	10,000	.....	Soledad, aviada.....	670	700	715
Guanajuato:				Sorpresa, aviada.....	300	280	295
Angustias, Pozos....	2,400	38	42	**Mexico:**			
Cinco Senores y An., aviadoras.....	2,000	36	40	Alacran.....	2,400	20	28
Cinco Senores y An., aviada	400	38	40	Aldebarren.....	2,000	22	28
Providencia, San Juan de la Luz.....	6,000	68	70	Buen Despacho.....	3,000	38	40
Queensland y Australia.....	300	45	55	Dos Estrellas.....	3,000	1,680	1,690
Guerrero:				La Esperanza (El Oro.).....	3,000	1,500	1,500
Delfina, 1st serie....	2,500	45	50	La Reformia, aviadores.....	2,000	20	24
Delfina, 2nd serie....	2,500	35	40	Santa Ana, Esperanza.....	2,400	.....	90
Garduno y Anexas...	7,200	30	40	**Michoacan:**			
Hidalgo:				Luz de Borda, aviadora.....	3,000	50	55
Amistad y Condordia	9,600	81	82	Luz de Borda, aviado.....	1,000	20	24
Carmen, aviada.....	1,100	60	90	Santiago y An., Tlal..	4,000	3	5
Guadalupe Fresnillo Mill.....	1,000	170	200	**Nuevo Leon:**			
Guadalupe Fresnillo Mine.....	1,400	70	80	La Fraternal.....	1,000	580	620
La Reina y An., aviadora.....	5,600	3	5	Norias de Bajan.....	1,000	880	920
Luz de Maravillas, aviadas.....	1,100	.....	20	**San Luis Potosi:**			
Maravillas y An., aviador.....	1,680	120	140	Concepcion y An.....	3,000	80	85
Maravillas el Lobo ..	1,000	130	180	El Barreno, aviadora.	2,000	70	71
Palma y An., aviador.....	1,850	8	16	Sta. Maria de la Paz..	9,600	183	185
Refugio, aviada.....	12,800	680	740	San Diegoy Annexas.	2,400	8	10
Santa Anay An., aviadora.....	1,900	50	70	**Zacatecas:**			
Santa Anay An., aviada.....	600	25	35	Asturiana y An.....	2,500	20	30
Sta. Gertrudis y An., aviadas.....	9,600	13	40	Candelaria y Pinos..	2,500	80	100
Sta. Gertrudis y An., aviadora.....	28,800	81½	82	Esperanza y An.....	2,400	6	8
Santo Tomas Apostol aviadoras.....	5,100	2	3	Lourdes.....	2,500	20	25
San Felipe de Jesus, aviadora.....	3,600	19	21	Luz de Minillas, pagadoras.....	2,000	.....	.....
San Felipe de Jesus, aviada.....	1,200	6	10	Nueva Quebradilla, aviadoras.....	2,400	35	50
San Rafael y An.,				Nueva Quebradilla, aviadas.....	600	30	45
				San Carlos y Annexas	2,500	60	65
				Sta. Maria de Gaud..	2,500	55	60
				Miscellaneous:			
				Bartolome de Medina	2,000	84	88
				Naica (Chihuahua.)..	100	11,000	13,000
				Natividad (Oaxaca) aviadora.....	1,800	950	100
				San Francisco Hac...	6,000	82	85
				Union Hacienda.....	3,000	270	280

LONDON. May 6

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Date.	Quotations. Buyers.	Sellers.
American:		£. s. d.	s. d.		£ s. d.	£ s. d.
*Alaska-Treadwell.....	200,000	5 0 0	1 6	Apr., 1904	4 12 6	4 17 6
Anaconda.....	1,200,000	5 0 0	2 0	May, 1904	3 17 6	4 0 0
Camp Bird.....	820,000	1 0 0	9	May, 1904	1 5 0	1 7 6
Copiapo.....	112,500	2 0 0	6 10	May, 1903	1 0 0	1 5 0
De Lamar.....	80,000	1 0 0	1 6	May, 1904	10 0	12 6
El Oro.....	1,080,000	1 0 0	9	Jan., 1904	1 2 6	1 5 0
Frontino & Bolivia.....	128,662	1 0 0	3 0	July, 1901	7 6	10 0
Le Roi.....	200,000	5 0 0	5 0	Nov., 1899	1 2 6	1 5 0
Le Roi No. 2.....	120,000	5 0 0	1 0	Feb. 1904	16 3	18 9
Montana.....	657,128	1 0 0	6	April, 1899	9	1 3
Palmarejo & Mexican...	445,000	1 0 0	rts.	April, 1903	7 6	8 0
Standard.....	500,000	4 0	2½	Sept., 1903	2 6	3 6
Stratton Independence.	1,000,007	1 0 0	6	Dec., 1903	3 9	4 3
St. John del Rey.....	546,265	1 0 0	6	Dec., 1903	11 6	12 6
Tomboy.....	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
Ymir.....	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares.....	15,000	3 0 0	5 0	Apr., 1904	3 10 0	4 0 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	3 10 0	3 15 0
*Rio Tinto.....	325,000	5 0 0	37 6	May, 1904	52 0 0	52 10 0
*Rio Tinto, preferred...	325,000	5 0 0	2 6	May, 1904	5 17 6	6 2 6
Tharsis.....	625,000	2 0 0	7 0	May, 1904	4 15 0	5 0 0
West Australian:						
Associated	495,388	1 0 0	2 0	Jan., 1904	3 5 0	3 7 6
*Cosmopolitan.....	400,000	1 0 0	1 0	Apr., 1904	13 3	13 9
Golden Horseshoe.....	300,000	5 0 0	6 0	Apr., 1904	7 18 9	8 1 3
Great Boulder.....	1,750,000	2 0	9	Mar., 1904	1 5 9	1 6 3
Gt. Boulder Persever'ce	1,400,007	1 0 0	1 3	May, 1904	1 0 6	1 1 6
Great Fingall.....	250,000	1 0 0	7 0	Apr., 1904	8 6 3	8 8 9
*Ivanhoe.....	200,000	5 0 0	7 6	Apr., 1904	8 0 0	8 2 6
*Kalgurli.....	120,000	1 0 0	2 6	Apr., 1904	5 10 0	5 12 6
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 3 9	1 6 3
Oroya-Brownhill.....	450,000	1 0 0	2 6	Mar., 1904	3 10 6	3 12 6
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	May, 1904	2 17 6	3 2 6
Briseis.....	600,000	1 0 0	.. ..	.....	8 9	9 3
Broken Hill.....	960,000	8 0	1 0	May, 1904	1 14 6	1 15 6
Mt. Lyell.....	275,000	3 0 0	4 3	Sept., 1903	16 6	17 6
Mt. Morgan.....	1,000,000	1 0 0	3	May, 1904	2 7 6	2 10 0
Waihi.....	497,412	1 0 0	4 6	June, 1904	5 15 0	5 17 6
Indian:						
Champion Reef.....	513,832	10 0	1 3	May, 1904	1 15 0	1 16 0
Mysore.....	566,043	10 0	5 6	Mar., 1904	6 7 6	6 10 0
Nundydroog.....	484,000	10 0	1 8	Mar., 1904	1 12 6	1 15 0
*Ooregum	343,000	10 0	1 3	Apr., 1904	1 0 0	1 2 6
*Oregum, pfd.....	240,000	10 0	1 3	Apr., 1904	1 8 9	1 11 3
South African:						
Angelo.....	600,000	1 0 0	4 0	Feb., 1904	6 15 0	7 0 0
Bonanza.....	200,000	1 0 0	10 0	Feb., 1904	1 2 6	1 7 6
British South Africa....	4,436,019	1 0 0	rts.	May, 1899	2 0 0	2 2 6
Cape Copper.....	300,000	2 0 0	4 0	Jan., 1904	2 17 6	3 2 6
Cape Copper, pfd.....	75,000	2 0 0	1 9	Jan., 1904	2 17 6	3 2 6
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 2 6	6 7 6
Consol. Gold-Fields.....	2,000,000	1 0 0	.. ..	.....	6 12 6	6 13 0
Crown Reef.....	120,000	1 0 0	18 0	Apr., 1904	15 0 0	15 10 0
De Beers, preferred.....	800,000	2 10 0	10 0	Jan., 1904	19 2 6	19 5 0
De Beers, deferred.....	1,000,000	2 10 0	15 0	Jan., 1904	18 5 0	18 10 0
East Rand.....	990,000	1 0 0	5 0	Aug., 1903	7 12 6	7 15 0
Ferreira.....	90,000	1 0 0	3 0	May, 1904	20 10 0	21 0 0
Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	5 10 0	5 15 0
Geduld.....	400,000	1 0 0	rts.	Mar., 1902	6 11 3	6 13 9
Henry Nourse.....	125,000	1 0 0	10 0	Feb., 1904	8 12 6	8 17 6
Jubilee.....	50,000	1 0 0	5 0	Feb., 1904	4 12 6	4 17 6
Jumpers.....	100,000	1 0 0	2 6	May, 1904	3 5 0	3 10 0
Langlaagte.....	470,000	1 0 0	2 0	Feb., 1904	3 16 3	3 18 9
May.....	288,750	1 0 0	3 6	Feb., 1904	4 2 6	4 3 9
Meyer & Charlton.....	100,000	1 0 0	5 0	Jan., 1904	5 7 6	5 12 6
Modderfontein	200,000	1 0 0	rts.	Apr., 1902	9 2 6	9 5 0
Namaqua.....	94,331	2 0 0	3 0	Dec., 1903	3 7 6	3 10 0
New Jagersfontein..	200,000	5 0 0	10 0	June, 1904	28 5 0	28 15 0
New Primrose.....	325,000	1 0 0	3 0	Mar., 1904	3 18 9	4 1 3
Rand.....	1,795,956	5 0	4 0	Aug., 1902	10 7 6	10 8 9
Robinson.....	750,000	5 0 0	5 6	Feb., 1904	9 12 6	9 17 6
Robinson Deep.....	950,000	1 0 0	3 0	Jan., 1904	5 5 0	5 10 0
Rose Deep	425,000	1 0 0	2 6	Feb., 1904	8 5 0	8 10 0
Salisbury	100,000	1 0 0	2 0	June, 1904	1 17 6	2 2 6
Village.....	400,000	1 0 0	3 0	Feb., 1904	6 12 6	6 17 6
Wemmer	80,000	1 0 0	10 0	Jan., 1904	10 15 0	11 5 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	May 11 £. s. d.	May 18 £. s. d.	Company.	May 11 £. s. d.	May 18 £. s. d.
Anaconda.....	3 15 0	3 17 6	El Oro.....	1 3 1⅛	1 3 1½
British So. Africa.	2 2 6	2 1 3	Modderfontein....	9 3 9	9 8 1½
*Camp Bird..	1 6 6	1 6 3	Rand Mines.....	10 8 9	10 11 3
Con. Gold Fields.	6 15 0	6 15 0	Rio Tinto	51 10 0	51 2 6
De Beers.....	13 0 0	19 10 0	Simmer & Jack...	1 7 1⅛	1 16 0
East Rand.....	7 13 9	7 17 6	Tomboy.....	1 6 3	1 6 3

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York. *Ex-dividend.

PARIS. April 28

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing. Fr.
Anzin, Coal.....	France	.....	.....	250.00	5,600.00	5,590.00
Boleo, c.....	Lower Cal.....	12,000,000	500	62.50	1,894.00	1,985.00
Champ d'Or, g.....	S. Africa.....	3,375,000	25	3.75	19.50	18.50
Courrieres, Coal.....	France	600,000	500	110.00	2,796.00	2,825 00
Fraser River, g.....	Brit. Col.....	250,000	25	.....	5.50	5.50
Huanchaca, s.	Bolivia.....	40,000,000	125	2.50	88.50	90.25
Laurium, z. l.....	Greece.....	16,300,000	500	25.00	320.00	320.00
Malfidano, z.....	Italy	12,500,000	500	50.00	593.00	594.00
Metaux, Cie. Fran. de.....	France	25,000,000	500	22.50	470.00	475.00
Mokta-el-Hadid, i. l.....	Algeria	18,312,000	500	40.00	875.00	885.00
Nickel, n.....	N. Caledonia..	15,000,000	250	22.50	555.00	566.00
Penarroya, Coal	Spain.....	.....	500	45.00	1,080.00	1,073.00
Vielle Montagne z.....	Belgium..	9,000,000	30	30.00	700.00	710.00
.....	.....	.....	.....	.....	.....	.....

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd.,	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Barry's Bay, Ont	"	.07½@.09½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.gr.	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10½@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.13
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal	2.47@2.49
Refined wood, 95@97%.	"	60@65
Purified	"	1.25@1.30
ALUM—Lump	100 lbs.	1.70
Ground	"	1.80
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate gram	"	.05⅝
Lump	"	.09¼
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¾
Oxide, com'l white, 95%	"	.03½
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.031@.03¼
Red	"	.06¾@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	lb.	.01¼@.03½
Egyptian, crude	"	.05½@.06
Gilsonite, Utah, ordin'y	lb.	.03
Select	"	.03¾
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21.00
Trinidad, refined	sh. ton	35.00
Ventura, Cal	sh. ton	32.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton	$25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.65 @1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05⅞
Sulphate (Blanc Fixe)	lb.	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-white	"	18.00
Foreign gray	"	13.50
Snow white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines: First grade	lg. ton	5.25@5.50
Second grade	"	4.50@4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.45
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.25@1.50
Foreign	"	1.75@2.25
"Rosendale," 300 lbs.	"	.80
Slag cement	"	.90@1.00
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg. ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton	8.25
Am. best, ex-dock, N. Y	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1 75
Nitrate	"	1.50
Oxide - Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.33
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	21
Glycerine for nitro	"	.12⅝@.12¾
FELDSPAR—Ground	sh. ton	10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lbs.	$0.80
Powdered	"	.85
GRAPHITE—Am. f. o. b. Providence, R. I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
Ceylon, common pulv.	lb.	.02¾@.03½
Best pulverized	"	.04@.06
German, com. pulv	"	.01¼@.01½
Best pulverized	"	.01½@.02
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l.	"	.01¼
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	lb.	.08¼@.08¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06½
" gran	"	.08¾
LIME—Com., abt. 250 lbs	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece. Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N.Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	130@200
MAGNESIUM—		
Carbonate, light, fine pd	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01¼@ 01½
75@85% binoxide	"	.01½@.02¾
85@90% binoxide	"	.02¾@.03¼
90@95% binoxide	"	.03¾@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.71
MICA—N. Y. grind, coarse	sh.ton	33.00@38.00
Fine	lb.	.00¾@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.		
25@30, cold test	gal.	13@.13¾
15, cold test	"	.13¾@.14¼
Zero	"	.18¼@.19¾
Summer	"	.12¾@.13¾
Cylinder, dark steam ref	"	.14¼@.16¼
Dark, filtered	"	.18¼@.19½
Light, filtered	"	.20¼@.21¾
Extra cold test	"	.24¾@.31¾
Gasoline, 86 @90	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.37@.42
Boiled	"	.44
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.15
Yellow, common	"	10¾
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd.	"	.05¼@.05¾
English Glassmakers'.	"	.08¼@.08⅞
Metallic, brown	sh. ton	19.00
Red	"	16 00
Ocher, Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.02¼
French, washed	"	.01¼@.01¾
Orange mineral, Am	"	.07½@.07¾
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	.11
PAINTS AND COLORS—		
Red lead, American	lb	$0.06¼@$0.06¾
Foreign	"	.07@.08¼
Turpentine, spirits	gal.	.53½@.53½
White lead, Am., dry	lb.	.04¾@.05
American, in oil	"	.05¾@.06¼
Foreign, in oil	"	.09 @.09⅛
Zinc, white, Am., ex. dry	"	.04⅜@.04¾
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.03½@.03⅝
POTASH—		
Caustic, ordinary	"	.04¼@.04⅞
Elect. (90%)	"	.05⅝
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran	"	.14
Bichromate, Am	"	.08¼@.08¾
Scotch	"	.08¾@.08¾
Bromide	"	@.30
Carbonate (80@85%)	"	3.50@4 00
Chlorate, powdered	"	.06¾@.07¼
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19@.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lbs.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09¾
Prussiate, yellow	"	.14¾@.14¾
Red	"	.36 @.36¾
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvinit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine	280 lbs.	bbl..72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lbs.	3.45@3.50
Refined	"	4.00@4 50
SILICA—		
Ground quartz, ord'ry	sh. ton	8.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.35½
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ord., bulk f.o b. works	100 lbs.	1.30
Extra domes., f. o. b. works	"	3.50
Bichromate	lb.	.06⅜
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.80
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 70@76%, f. o. b. works	"	1.75@1.90
Foreign, f.o.b N. Y.	"	1.50@1.35
Chlorate, com'l	"	.06¼@.06⅝
Hyposulphite, Am	"	1.80@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	2.25@2.30
Shipments	"	2.05@2.15
Peroxide	lb.	.45
Phosphate	"	.02½@.02¾
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide, crystals, bbl.	lb.	.01¾
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	2.10
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade.	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	100 lbs.	2.50
Italian, best	"	2.25
TAR—Regular	bbl.	2.25
Oil, bbl	"	5.70
TIN—Crystals, bbl	lb.	.21
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02
Chloride granular	"	.04¾@.05
Dust	"	.05½@.05¾
Sulphate	"	.02 @.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07⅛@.08⅛
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.